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5 CANNABIS AND HALLUCINOGENS

WORLD DRUG REPORT 2019

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Comments on the report are welcome and can be sent to:

Division for Policy Analysis and Public Affairs
United Nations Office on Drugs and Crime
PO Box 500
1400 Vienna
Austria
Tel: (+43) 1 26060 0
Fax: (+43) 1 26060 5827

E-mail: wdr@un.org
Website: www.unodc.org/wdr2019

PREFACE

The findings of this year's *World Drug Report* fill in and further complicate the global picture of drug challenges, underscoring the need for broader international cooperation to advance balanced and integrated health and criminal justice responses to drug supply and demand.

With improved research and more precise data from India and Nigeria – both among the 10 most-populous countries in the world – we see that there are many more opioid users and people with drug use disorders than previously estimated. Globally, some 35 million people, up from an earlier estimate of 30.5 million, suffer from drug use disorders and require treatment services. The death toll is also higher: 585,000 people died as a result of drug use in 2017.

Prevention and treatment continue to fall far short of needs in many parts of the world. This is particularly true in prisons, where those incarcerated are especially vulnerable to drug use and face higher risks of HIV and hepatitis C transmission. This gap represents a major impediment to achieving the Sustainable Development Goals and fulfilling the international community's pledge to leave no one behind.

Synthetic opioids continue to pose a serious threat to health, with overdose deaths rising in North America and trafficking in fentanyl and its analogues expanding in Europe and elsewhere. The opioid crisis that has featured in far fewer headlines but that requires equally urgent international attention is the non-medical use of the painkiller tramadol, particularly in Africa. The amount of tramadol seized globally reached a record 125 tons in 2017; the limited data available indicate that the tramadol being used for non-medical purposes in Africa is being illicitly manufactured in South Asia and trafficked to the region, as well as to parts of the Middle East.

The response to the misuse of tramadol illustrates the difficulties faced by countries in balancing necessary access for medical purposes while curbing abuse – with limited resources and health-care systems that are already struggling to cope – and at the same time clamping down on organized crime and trafficking.

Opium production and cocaine manufacture remain at record levels. The amounts intercepted are also higher than ever, with the amount of cocaine seized up 74 per cent over the past decade, compared with a 50 per cent rise in manufacture during the same period. This suggests that law enforcement efforts have become more effective and that strengthened international cooperation may be helping to increase interception rates.

The *World Drug Report 2019* also registers a decline in opiate trafficking from Afghanistan along the "northern" route through Central Asia to the Russian Federation. In 2008, some 10 per cent of the morphine and heroin intercepted globally was seized in countries along the northern route; by 2017 it had fallen to 1 per cent. This may be due in part to a shift in demand to synthetics in destination markets. The increased effectiveness of regional responses may also play a role.

Countries in central Asia, with the support of the United Nations Office on Drugs and Crime (UNODC), have committed considerable resources to strengthening regional cooperation through integrated UNODC country, regional and global programmes, as well as through platforms such as the Central Asian Regional Information and Coordination Centre, the Afghanistan–Kyrgyzstan–Tajikistan Initiative and the Triangular Initiative and its Joint Planning Cell. More research is needed, including to identify lessons learned and best practices that could inform further action.

International cooperation has also succeeded in checking the growth in new psychoactive substances. The Vienna-based Commission on Narcotic Drugs has acted swiftly in recent years to schedule the most harmful new psychoactive substances, and the UNODC early warning advisory has helped to keep the international community abreast of developments.

Political will and adequate funding remain prerequisites for success. Efforts by Colombia to reduce cocaine production following the 2016 peace deal

with the Revolutionary Armed Forces of Colombia (FARC) are a case in point. Alternative development initiatives have enabled farmers in central areas of the country previously under FARC control to abandon coca bush cultivation and join the licit economy. The result has been a drastic reduction in cocaine production. However, in other areas previously controlled by FARC, criminal groups have moved in to fill the vacuum and expand cultivation. Alternative development can succeed, but not without sustained attention and integration into broader development goals.

The successes identified amid the many, formidable problems that countries continue to face in grappling with drug supply and demand highlight that international cooperation works. The challenge before us is to make this cooperation work for more people.

International cooperation is based on agreed frameworks. Nearly every country in the world has reaffirmed its commitment to balanced, rights-based action based on the international drug control conventions. The most recent reaffirmation of that commitment is the Ministerial Declaration on Strengthening Our Actions at the National, Regional and International Levels to Accelerate the Implementation of Our Joint Commitments to Address and Counter the World Drug Problem, adopted at the ministerial segment of the sixty-second session of the Commission on Narcotic Drugs.

UNODC supports countries in putting their commitments into action through the application of international standards on the prevention and treatment of drug use disorders and HIV, as well as standards and norms on the administration of justice and the treatment of prisoners. We provide tailored technical assistance through our field offices and global programmes, and through toolkits and research.

I hope the *World Drug Report 2019* will shed further light on the world drug problem and inform international community responses. By working together and focusing attention and resources, we can help people get the services they need without discrimination, promote security and bring criminals to justice, safeguard health and achieve the Sustainable Development Goals.

Yury Fedotov
Executive Director
United Nations Office on Drugs and Crime

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General coordination and content overview
Chloé Carpentier
Angela Me

Analysis and drafting
Kamran Niaz
Thomas Pietschmann

Data management and estimate production
Enrico Bisogno
Conor Crean
Hernan Epstein
Sabrina Levissianos
Andrea Oterová
Umidjon Rakhmonberdiev
Ali Saadeddin
Tun Nay Soe
Irina Tsoy
Fatma Usheva
Lorenzo Vita

Editing
Joseph Boyle
Jonathan Gibbons

Graphic design and production
Anja Korenblik
Suzanne Kunnen
Kristina Kuttnig
Fabian Rettenbacher

Coordination
Francesca Massanello

Administrative support
Iulia Lazar

Review and comments
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Jonathan Caulkins
Paul Griffiths
Marya Hynes
Vicknasingam B. Kasinather
Charles Parry
Afarin Rahimi-Movaghar
Peter Reuter
Alison Ritter
Francisco Thoumi

EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by crosshatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report*, if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral term "drug use" is used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" and the term "drug use" in the *World Drug Report* refer to substances controlled under the international drug control conventions, and their non-medical use.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the UNODC through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2017 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

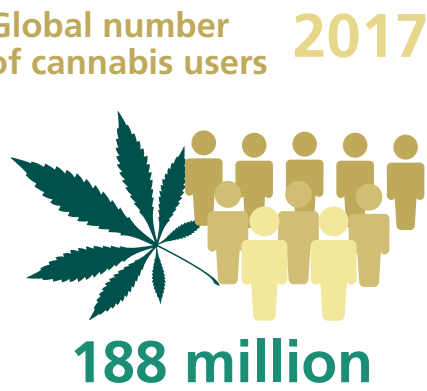
References to tons are to metric tons, unless otherwise stated.

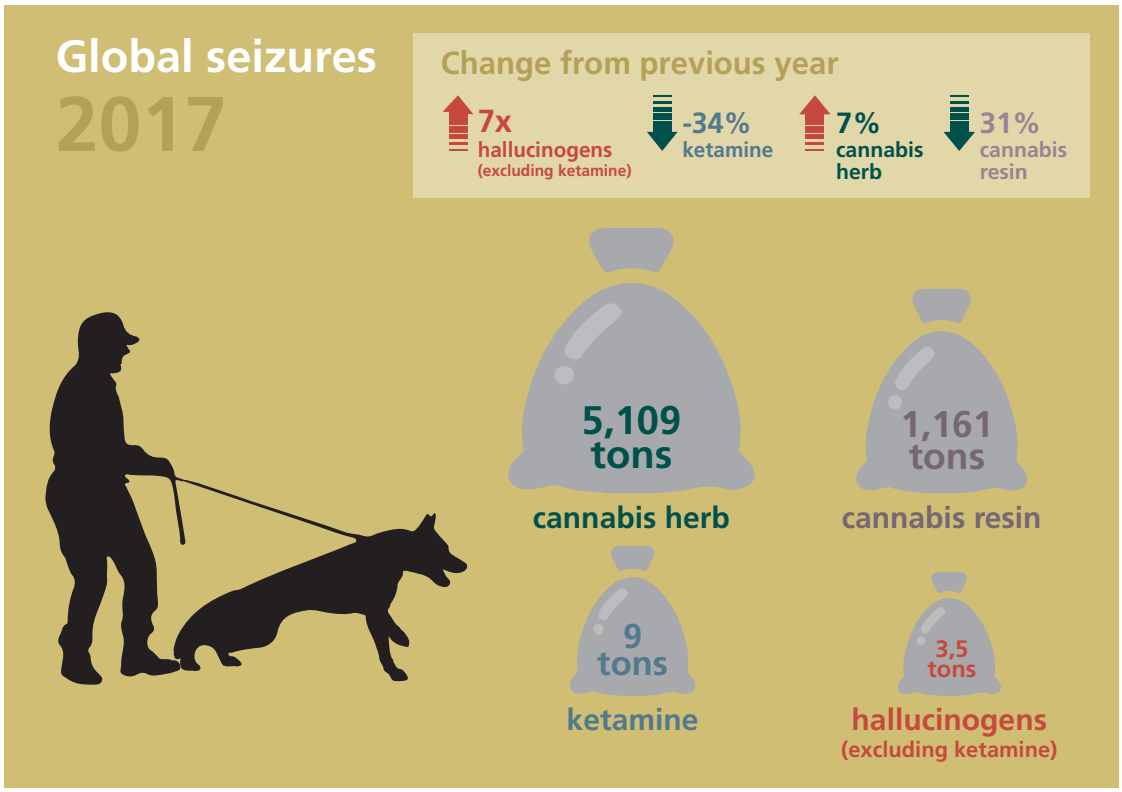
The following abbreviations have been used in the present booklet:

ATS	amphetamine-type stimulants
CBD	cannabidiol
CBN	cannabinol
DMT	dimethyltryptamine
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
ha	hectares
LSD	lysergic acid diethylamide
MDMA	3,4-methylenedioxymethamphetamine, commonly known as "ecstasy"
NPS	new psychoactive substances
PCP	phencyclidine
THC	(Δ-9 – tetrahydrocannabinol)
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization

SCOPE OF THE BOOKLET

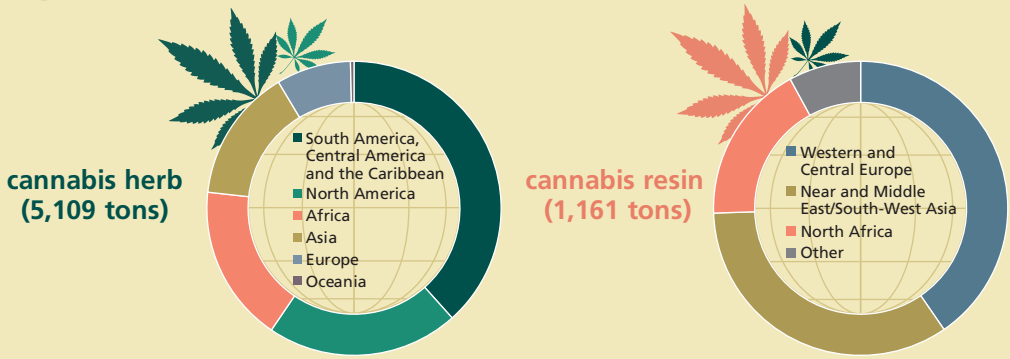
Constituting the fifth chapter of the *World Drug Report 2019*, the present booklet contains an analysis of the global market for cannabis that looks at supply in terms of cultivation and production of and trafficking in cannabis herb and cannabis resin, as well as consumption in terms of trends in the prevalence of use of cannabis. The booklet also gives an overview of developments in measures regulating the non-medical use of cannabis in Canada, the United States of America and Uruguay and contains an analysis of the global market for different hallucinogens that examines recent developments in seizures and trends in the prevalence of their use.





CANNABIS

2017 Quantity of cannabis seized by region



Introduction

Although there is an ongoing debate as to whether the genus cannabis comprises one or more species, the drug is currently considered to be monospecific (*Cannabis sativa* L) by the scientific community.[1, 2] There are two subspecies of the plant (*Sativa* and *Indica*) and four varieties. Cannabis plants contain 70 unique compounds, collectively known as phytocannabinoids,[3] the main psychoactive substance being THC, which provides the psychoactive effects of cannabis.

Produced in almost every country, cannabis herb consists of the dried and crumbled leaves and flowering tops of the cannabis plant, which are generally smoked. By contrast, cannabis resin, which is the concentrated extract of cannabis flower and plant, is mainly produced in a few countries in North Africa, the Middle East and South-West Asia. Hash oil is a cannabis product that can be extracted from any part of the plant, with minimal or no residual solvent. Cannabis is controlled under the Single Convention on Narcotic Drugs of 1961 as amended by the 1972 Protocol (Schedules I and IV).

In the past two decades, there have been rapid advances in cannabis plant cultivation techniques. This has led to the spread of domestic (indoor) cultivation, thereby reducing reliance on imported cannabis products. Based on the cultivation of unpollinated female cannabis plants (sinsemilla), indoor cannabis plant production involves the use of controlled growing conditions and genetically selected strains, which has led to an increase in the number of harvests, as well as in yield and potency. Mainly focused on achieving high THC content, selective breeding has also resulted in the selection of varieties containing lower levels of CBD.[4]

In addition to the major transformation of cannabis cultivation in recent years, the cannabis market has diversified to the extent that it now comprises a broad range of products with varying means of ingestion, potency and effects.

1 WHO Expert Committee on Drug Dependence, Pre-review, "Cannabis plant and cannabis resin: section 1 – Chemistry" (Geneva, 2018).

2 The letter "L" denotes Carl Linnaeus, who, in 1753, gave the botanical name to the plant.

3 Jerrold S. Meyer and Linda F. Quenzer, eds., *Psychopharmacology: Drugs, the Brain, and Behaviour*, 3rd ed. (Oxford, Oxford University Press, 2019).

4 EMCDDA, *Cannabis Production and Markets in Europe*, EMCDDA Insights Series No. 12 (Luxembourg, Publications Office of the European Union, 2012).

Supply of cannabis

Cannabis cultivation and production affect all regions

In contrast to the production of other plant-based drugs, which is concentrated in a limited number of countries, cannabis is produced in almost all countries across the world. Cannabis plant cultivation was reported to UNODC through either direct indicators (cultivation or eradication of cannabis plants and eradication of cannabis-producing sites) or indirect indicators (seizure of cannabis plants, origin of cannabis seizures reported by other Member States) by 159 countries, covering 97 per cent of the world's total population, over the period 2010–2017.

Most countries do not have systems in place to systematically monitor the area under cannabis cultivation. Thus, in general, estimates of the area under cannabis cultivation made available to UNODC may not meet strict scientific standards and must be interpreted with caution. For the time being, no single indicator is available for reliably estimating the area under cannabis cultivation at the global level.

However, a number of indicators (such as hectares of cannabis eradicated, number of cannabis plants eradicated, number of cannabis sites eradicated, number of cannabis plants seized and origin of cannabis seized) may be used to identify where cannabis cultivation and production are likely to occur. Analysis of the various indicators over the period 2010–2017 has shown that cannabis cultivation and production occur to a large extent in the following countries (in descending order of estimated potential magnitude of cultivation and production):

Americas

- North America: Mexico, the United States of America and Canada
- South America: Paraguay, Brazil, Colombia, Peru and Chile
- Central America: Guatemala and Costa Rica;
- Caribbean: Jamaica

Africa

- Morocco, Nigeria, Eswatini, the Sudan, South Africa, Malawi, the Democratic Republic of Congo and Ghana

Europe

- Western and Central Europe: the Netherlands, Italy, the United Kingdom of Great Britain and Northern Ireland, Spain and Belgium
- South-Eastern Europe: Albania
- Eastern Europe: the Russian Federation and Ukraine

Asia

- Near and Middle East: Afghanistan, Pakistan and Lebanon
- Central Asia: Kyrgyzstan and Tajikistan
- South Asia: India and Nepal
- East and South-East Asia: Indonesia and the Philippines

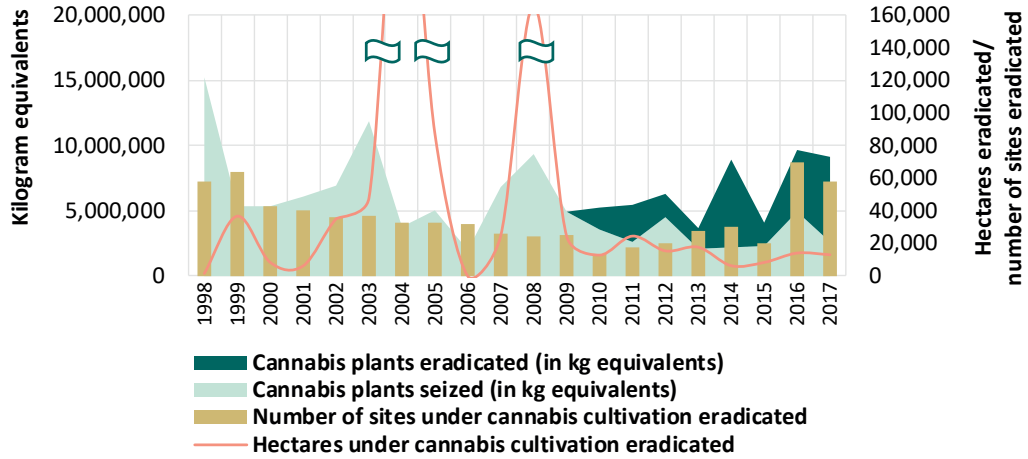
Oceania

- Australia and New Zealand

Trends in indirect indicators of cannabis cultivation have been fluctuating over the years. Significant seizures of cannabis plants were made in 1998 as a result of large seizures reported by Turkey, Egypt, Nigeria and Paraguay (in descending order), while the number of hectares under cannabis cultivation eradicated reached a peak in 2004, mainly owing to large eradications reported by the Russian Federation; large eradications were reported by Albania in 2008. In 2017, the largest numbers of cannabis sites eradicated and the largest areas under cannabis cultivation eradicated were reported by Mexico, while the largest numbers of cannabis plants eradicated were reported by Paraguay, followed by India, and the largest quantity of cannabis plants seized was reported by Guatemala.

Despite those fluctuations, based on qualitative information provided by 105 countries (an average of 35 countries per year), in six out of seven years, more countries reported an increase in cannabis cultivation than a decline. Based on those perceptions, overall cannabis cultivation is thought to have increased over the period 2010–2017, with most of the increase reported to have occurred over the period 2014–2017.

FIG. 1 Global quantity of cannabis plants seized and eradication of cannabis plants, 1998–2017



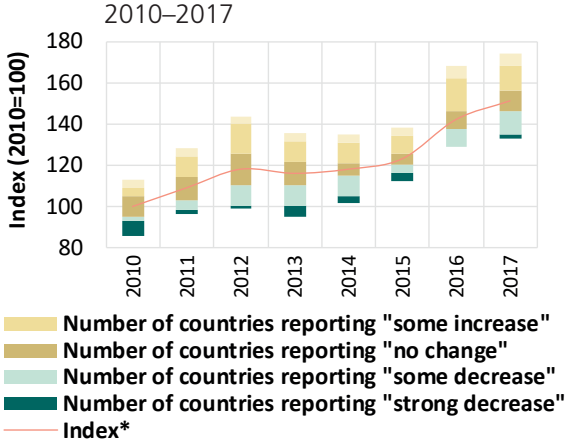
Source: UNODC, responses to the annual report questionnaire.

Outdoor cultivation of cannabis is more widespread than indoor cultivation, but the increase in indoor cultivation of cannabis is larger

Available data suggest that outdoor cannabis cultivation continues to be more widespread at the global level than indoor cannabis cultivation. Over the period 2013–2017, 80 countries reported outdoor cannabis cultivation and/or law enforcement activities linked to outdoor cannabis cultivation (eradication, seizures of cannabis plants, dismantling of cannabis-producing sites) to UNODC and 55 countries reported indoor cannabis cultivation. While outdoor cannabis cultivation is found around the globe, most of the countries reporting indoor cultivation are located in Europe, followed by North America (Canada and the United States), Central America (Costa Rica, El Salvador, Honduras and Panama) and South America (Chile, Colombia, Ecuador and Uruguay). Beyond those regions, indoor cannabis cultivation still seems to be limited and has been reported by only two countries in Oceania (Australia and New Zealand) and a few countries in Asia (Armenia, Georgia and Israel, as well as Hong Kong, China).

Trend data (based on qualitative information reported by Member States) suggest that both outdoor and indoor cannabis cultivation increased at the global level over the period 2013–2017, although the increase in indoor cultivation appears to have been larger than that in outdoor cultivation. The increasing importance of indoor cannabis cultivation is closely associated with an overall increase in the THC content of cannabis on the main markets over the past two decades.[5, 6]

FIG. 2 Qualitative information on trends in cannabis cultivation (index: 2010=100), 2010–2017



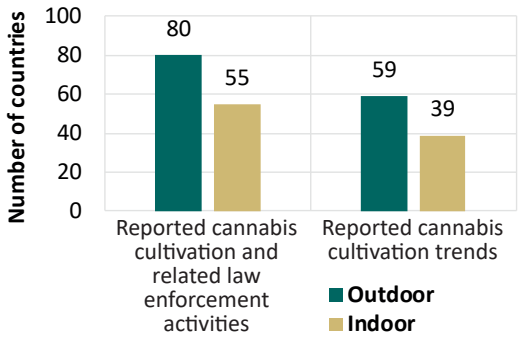
Source: UNODC, responses to the annual report questionnaire.

** Number of countries reporting increases less number of countries reporting decreases (2 points for "strong increase", 1 point for "some increase", 0 points for stable, -1 point for "some decline", -2 points for "strong decline"), 2010=100.*

5 EMCDDA, "Price, purity and potency", Statistical Bulletin 2018 (and previous years).

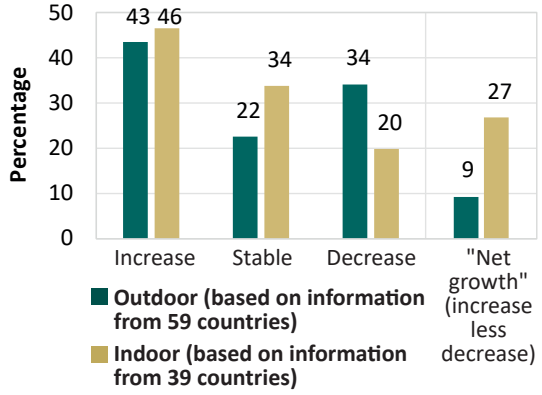
6 Mahmoud A. ElSohly and others, "Changes in cannabis potency over the last 2 decades (1995-2014): analysis of current data in the United States, *Biological Psychiatry* (Amsterdam, Elsevier, 2016), pp. 1–7.

FIG. 3 Countries reporting outdoor and indoor cannabis cultivation, 2013–2017



Source: UNODC, responses to the annual report questionnaire.

FIG. 4 Reported trends in outdoor and indoor cannabis cultivation, 2013–2017

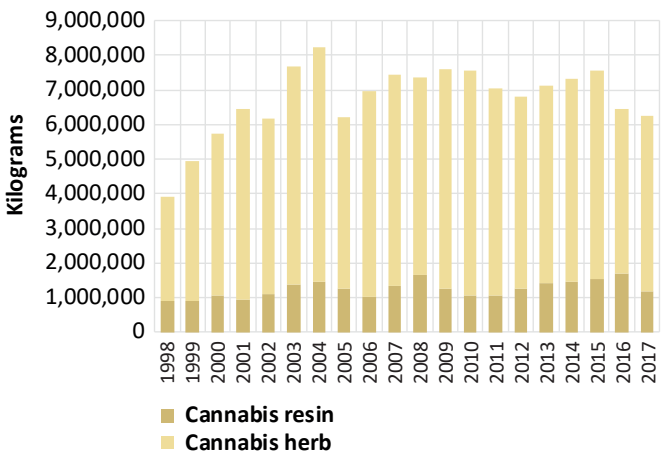


Source: UNODC, responses to the annual report questionnaire.
Note: Numbers in the figure have been rounded.

Global cannabis seizures remained stable in 2017

Over the period 2010–2017, 166 countries reported to UNODC that they had seized cannabis herb or resin (113–140 countries per year). In terms of weight, the amounts of cannabis herb and resin seized remained largely unchanged in 2017 (at some 6,300 tons), compared with the previous year, and were in line with trend data on the number of seizure cases. Seizures were markedly larger than in 1998 (3,900 tons) but were smaller than in most years since 2000, with peaks of 8,200 tons in 2004 and more than 7,500 tons in 2010 and 2015. The smaller quantities of cannabis seized and reported in 2016 and 2017 may have been the result of less reporting in some countries, coupled with possible shifts in the priorities of law enforcement authorities, notably in the Americas, where the largest quantities seized had previously been reported. In terms of weight, 49 per cent of all cannabis herb and resin seized in 2017 were in the Americas, followed by 18 per cent in Asia, 17 per cent in Africa, 15 per cent in Europe and less than 1 per cent in Oceania.

FIG. 5 Global quantities of main cannabis products seized, 1998–2017



Source: UNODC, responses to the annual report questionnaire.

While the decline in the quantities of cannabis seized in 2016 was linked to smaller quantities reported in Africa (partly linked to reporting issues) and North America (possibly a consequence of shifts in the priorities of law enforcement authorities owing to the liberalization of cannabis markets in several parts of the continent),[7] data for 2017 show an ongoing decline in cannabis seizures in North America, Asia and Africa (mostly resulting from fewer seizures in North Africa and fewer African countries reporting to UNODC) and increases (in descending order) in South America, Oceania, Europe and the Caribbean.

In terms of products, herbal cannabis continued to account for for the majority of cannabis seized in 2017 (81 per cent) at the global level. Data show

7 United States, Government Accountability Office, *State Marijuana Legalization: DOJ Should Document Its Approach to Monitoring the Effects of Legalization*, GAO report GAO-16-1 (Washington D.C., December 2015).

decreases in the quantity of cannabis resin seized in 2017 (by 31 per cent, from very high levels reported the previous year), while the quantity of cannabis herb seized increased slightly (7 per cent), reflecting increases in the quantities intercepted in South America (79 per cent), Oceania (69 per cent), Europe (37 per cent), Asia (16 per cent) and the Caribbean (15 per cent), which more than offset the continuing decline in the quantity of cannabis herb seized in North America (41 per cent less than in 2016).

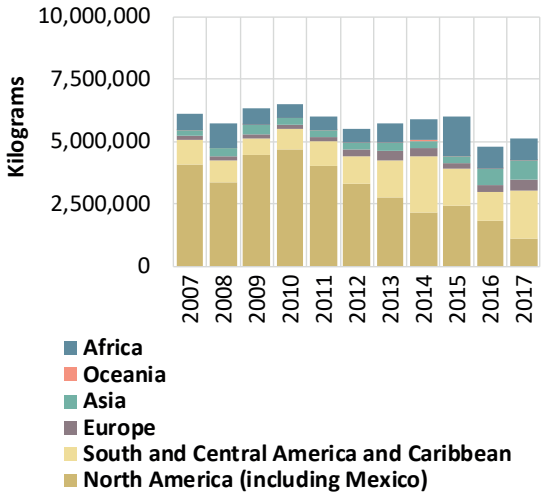
Quantities of cannabis herb seized continue to decline markedly in North America following major transformation of the cannabis market

In 2017, as in previous years, the Americas continued to account for the largest share of the global quantity of cannabis herb seized (60 per cent of the global total). South America alone accounted for 38 per cent of the global total and North America for 21 per cent. This was in contrast to most of the previous years, when the largest amount of cannabis herb seized had been reported in North America. The next-largest amounts seized were reported in Africa (17 per cent of the total), Asia (15 per cent), Europe (8 per cent) and Oceania (0.4 per cent).

Despite a slight increase to 5,100 tons, the global quantity of cannabis herb seized in 2017 was still one of the smallest reported since 2000. The decline in the quantity of cannabis herb seized (over 20 per cent) since 2010 was driven by decreases reported in North America (77 per cent), with marked declines reported in Mexico (83 per cent), the United States (71 per cent) and Canada (67 per cent).

The decline in the amounts of cannabis herb reported seized in North America has gone hand in hand with significant increases in the use of cannabis herb in the subregion over the past decade. Detailed data from the United States show a sharp increase in the number of annual users of cannabis over the period 2007–2017 (63 per cent), which was exceeded by an increase in daily or near-daily users of cannabis of some 130 per cent over the same period;[8, 9] this is of importance as most cannabis is consumed by daily or near-daily users.[10, 11] It can thus be excluded that the decline in seizures of cannabis herb in North America was merely a consequence of a shrinking cannabis market in the subregion.

FIG. 6 Global quantities of cannabis herb seized, 2007–2017



Source: UNODC, responses to the annual report questionnaire.

Conversely, the quantity of cannabis herb seized in regions other than North America doubled over the period 2007–2017. Qualitative information reported by Member States to UNODC suggests a

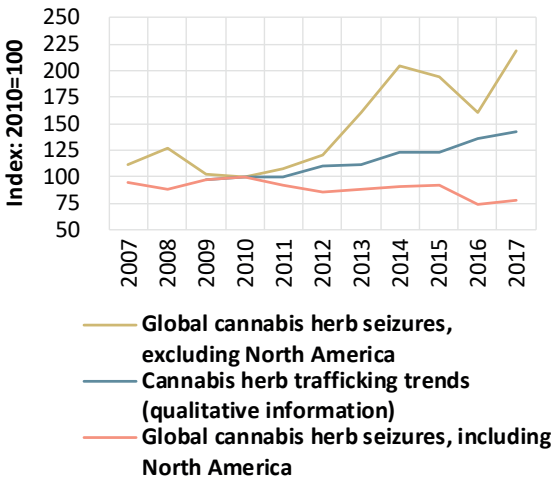
8 Jonathan P. Caulkins and others, "Beyond prevalence: importance of estimating drug consumption and expenditures", *Addiction*, vol. 110, No. 5 (Society for the Study of Addiction, 2015).

9 Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Marijuana Policy Group, August 2018).

10 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health*, HHS Publication No. SMA 18-5068, NSDUH Series H-53 (Rockville, Maryland, 2018). United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2017 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, September 2018).

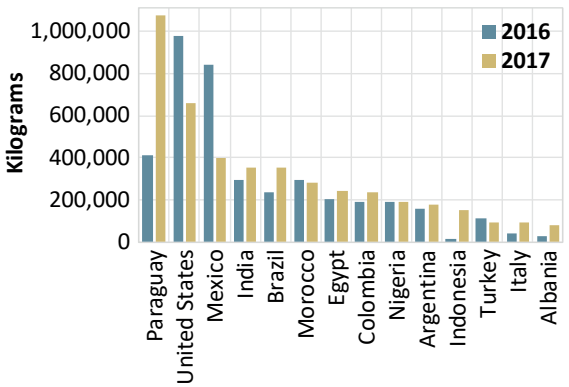
11 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2017 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, September 2018).

FIG. 7 Global trends in the quantity of cannabis herb seized and trends in cannabis herb trafficking, 2007–2017



Source: UNODC, responses to the annual report questionnaire.

FIG. 8 Quantities of cannabis herb seized in the countries reporting the largest amounts, 2016 and 2017



Source: UNODC, responses to the annual report questionnaire.

slight, although steady, upward trend in cannabis trafficking over the past decade (based on information from 86 countries). This trend suggests that, rather than reflecting a global downward trend in the supply of cannabis herb, the global decline in seizures of cannabis herb may be the result of the major transformation that the cannabis market in the United States has undergone since 2010. It is worthy of note that the decline in seizures in North America started after the first referendum on the legalization of cannabis for non-medical use, which was held in California in 2010 and received much media attention although it was rejected, and before the referendums on the legalization of the non-medical use of cannabis in Washington and Colorado in 2012, when such use was approved by the electorate.[12]

In 2017, for the first time ever, Paraguay reported seizing the largest quantity of cannabis herb globally. In that year, cannabis herb produced in Paraguay was reported to have been mainly destined for neighbouring Brazil (77 per cent) and Argentina (20 per cent). In parallel, Brazil has repeatedly reported Paraguay as being the main country of origin of the cannabis herb seized on its territory.

The major increase in the quantity of cannabis herb seized in Paraguay in 2017 was mainly the result of two major seizures in the Department of Amambay, in the northern part of the country, on the border with Brazil, where most cannabis cultivation is concentrated. Large amounts of cannabis herb in South America were also reported seized by Brazil and Colombia.

The largest quantity of cannabis herb seized in Asia was reported by India. Morocco, Egypt and Nigeria (in descending order) reported seizing the largest amounts in Africa; and Turkey, Italy and Albania (in descending order) accounted for the largest quantities of cannabis herb seized in Europe. Overall, trafficking in cannabis herb remains mainly intraregional. Over the period 2013–2017, the countries that were most frequently mentioned in the annual report questionnaire as the main countries of origin, departure or transit of seized cannabis herb were (in descending order of frequency of times they were mentioned):

- North America: Mexico, the United States and Canada
- South America: Paraguay and Colombia
- Central America: Guatemala
- Caribbean: Jamaica
- Africa: Ghana, Mozambique and the United Republic of Tanzania
- Europe: the Netherlands, Albania and Spain

12 For more information, see *World Drug Report 2017: Market Analysis of Plant-Based Drugs* (United Nations publication, Sales No. E.17.XI.6 (Booklet 3)).

- Asia: India, Myanmar, Afghanistan, Malaysia and Kyrgyzstan

Oceania is the only region where the most frequently mentioned countries (United States and Canada) are located outside the region.

Intraregional trafficking, which is the predominant form of cannabis herb trafficking, is mainly carried out by road, rather than by sea or air. There have been only a few exceptions where cannabis herb appears to have been trafficked more by sea; such trafficking was reported by two countries in 2017 (Indonesia and Italy), two countries in 2016 (Costa Rica and Italy) and two countries in 2015 (Italy and Panama).

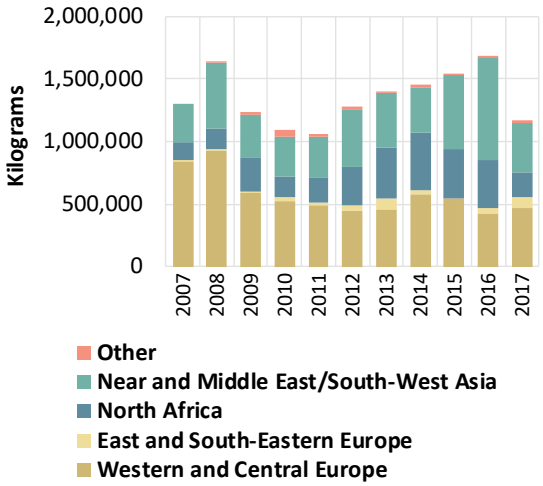
Global upward trend in cannabis resin seizures came to a halt in 2017, mainly as a result of a decline in seizures in production regions

The upward trend in the global quantity of cannabis resin seized over the period 2011–2016 came to a halt in 2017, when it declined by some 30 per cent worldwide, to its lowest level since 2011. That decline was a result of a halving of the quantities seized in the world's main cannabis resin-producing subregions, North Africa, the Near and Middle East/South-West Asia. By contrast, the quantity of cannabis resin seized in Western and Central Europe increased by roughly 10 per cent in 2017.

Qualitative information on trends in trafficking in cannabis resin (based on data from 68 countries reporting over the period 2007–2017) points to an increase since 2012, including in 2017, irrespective of the global decline in the amount of cannabis resin seized in that year. However, the overall reported increase in cannabis resin trafficking in 2017 was less pronounced than in previous years.

The overall upward trend in cannabis resin trafficking in 2017 masks different patterns across regions. Seizure data and qualitative information on trends suggest that there was a decline in cannabis resin trafficking in Morocco in 2017, although that has not yet had an impact on subsequent trafficking within the cannabis resin consumer markets. Spain reported a stable trend, while France and a number of other European countries reported an increase in cannabis resin trafficking activities in 2017. In fact, the amount of cannabis resin seized increased in 21 out of 29 countries in Western and Central Europe in 2017.

FIG. 9 Global quantities of cannabis resin seized, 2007–2017

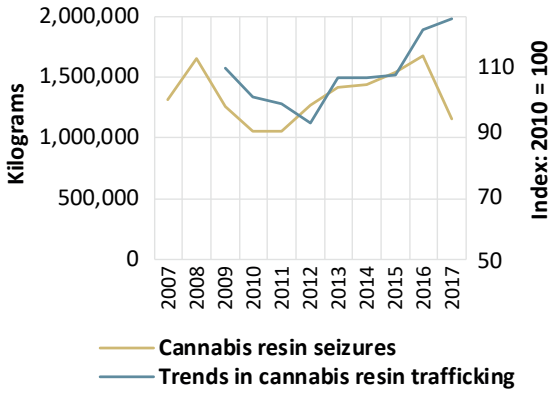


Source: UNODC, responses to the annual report questionnaire.

One of the main exceptions was Italy, which reported a sharp decrease in the quantity of cannabis resin seized (22 per cent less in 2017 compared with the previous year and 84 per cent less compared with 2014). This mainly reflects changes in cannabis trafficking routes, as the most direct route for trafficking cannabis resin of Moroccan origin via Libya to Italy, which accounted for 66 per cent of all identified cannabis resin shipments in 2013, decreased in importance to the extent that most Moroccan cannabis resin was shipped via Spain and France to Italy in 2017. Trafficking in cannabis resin from Morocco via Algeria to Libya also decreased, with the quantity of cannabis resin seized in Algeria in 2017 decreasing by more than 50 per cent compared with the previous year and by 75 per cent compared with 2013.

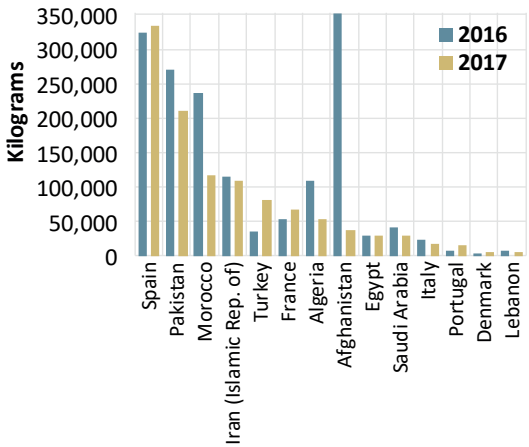
The patterns are less clear for South-West Asia. Afghanistan reported a decrease of 90 per cent in the quantity of cannabis seized in 2017 compared with 2016, although the quantity reported in 2017 was still at a similar level to those reported in 2013 and 2014 and was still larger than that reported in 2010. Decreases were also reported by Pakistan (22 per cent), the Islamic Republic of Iran (6 per cent)

FIG. 10 Global trends in quantities of cannabis resin seized, and qualitative information on trends in cannabis resin trafficking, 2007–2017



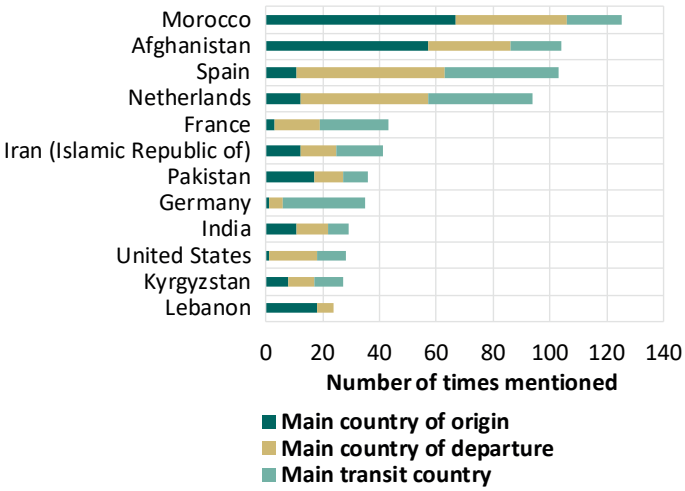
Source: UNODC, responses to the annual report questionnaire.

FIG. 11 Quantities of cannabis resin seized in the countries reporting the largest amounts, 2016 and 2017



Source: UNODC, responses to the annual report questionnaire.

FIG. 12 Main countries of origin, departure and transit of cannabis resin as reported by Member States, 2013–2017[a]



Source: UNODC, responses to the annual report questionnaire.

[a] *Based on data from 67 countries providing such information to UNODC over the period 2013–2017.*

and the rest of the Near and Middle East (53 per cent). In the Islamic Republic of Iran, which reports that all cannabis resin is imported from either Afghanistan or Pakistan, qualitative information suggested that trafficking in cannabis resin continued to decrease in 2017. An increase in cannabis resin trafficking was reported by India in 2017, a country where over half (59 per cent in 2016) of the cannabis resin intercepted is sourced from domestic production and the remainder originates in neighbouring Nepal.

Trafficking in cannabis resin continues to be far more geographically concentrated than trafficking in cannabis herb. Some 34 per cent of the total quantity of cannabis resin seized worldwide in 2017 was intercepted in the Near and Middle East and South-West Asia, 18 per cent in North Africa and 40 per cent in Western and Central Europe; those three subregions accounted for 92 per cent of all cannabis resin seized worldwide in 2017.

During the period 2013–2017, Morocco, where some 47,000 ha was reported by the Government to be under cannabis cultivation in 2017, was mentioned in almost a quarter of cases as the main country of origin of cannabis resin seized worldwide. It was followed by Afghanistan (where a UNODC survey in 2010 revealed an area of 9,000–29,000 ha under cannabis cultivation),[13] which was reported as the country of origin of cannabis resin in one fifth of cases. Cannabis resin produced in Morocco is mainly destined for other markets in North Africa (it was listed as the country of origin in 83 per cent of reports by countries in the subregion) and in Western and Central Europe (listed as the country

13 UNODC and Ministry of Counter Narcotics of Afghanistan, *Afghanistan: Cannabis Survey 2010* (Vienna, 2011).

Countries of origin/departure/transit and final destination of drugs

Submitted to Member States by UNODC each year, the annual report questionnaire contains a set of questions on drug supply designed to improve the understanding of how international trafficking in specific drugs is organized.

Based on drugs seized, Member States are asked to provide the three main producing/manufacturing countries ("countries of origin") of each drug, its three main "departure countries", i.e. the countries from where the drug was actually shipped, the three main "transit countries" from where the drug entered the respective country, and its three main "final destination countries". This information is subsequently analysed to identify the major drug trafficking patterns of different drugs.

One drawback is that not all countries are in a position to differentiate accurately between "countries of origin", "countries of departure" and "transit countries". In this context, some of the analysis in the *World Drug Report* is based on aggregated information provided on "countries of origin", "departure countries" and "transit countries" so as to reduce the bias resulting from potentially incorrect reporting.

Moreover, as not all countries provide such information on a regular basis, to avoid any subsequent biases that are simply the result of the reporting or non-reporting of countries in individual years, data are often presented over a five-year period (for example, 2013–2017).

of origin in 43 per cent of all reports by countries in the subregion); 14 per cent of the cannabis resin reported seized by countries in Western and Central Europe originated in Afghanistan. Some cannabis resin of Moroccan origin is also trafficked to Eastern Europe and South-Eastern Europe. Most of the cannabis resin produced in Morocco that is destined for Europe is shipped to Spain, from where it is smuggled to other markets in the region. For years, including over the period 2013–2017, Spain has been identified by other European countries as the principal departure and transit country for cannabis resin, followed by the Netherlands.

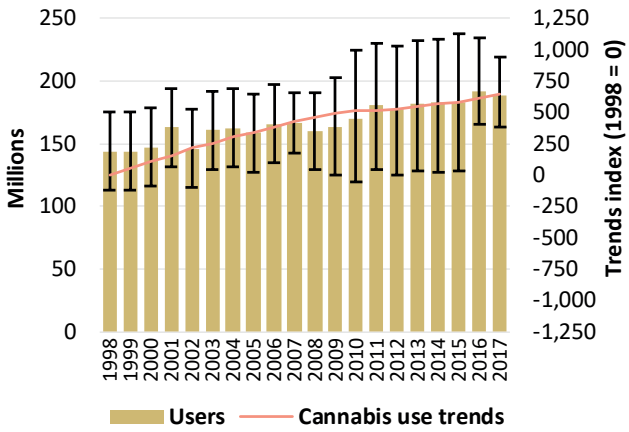
Afghanistan appears to be the second most important source country of cannabis resin worldwide, with 20 per cent of all cannabis resin seized worldwide reported in the annual report questionnaire over the period 2013–2017 as originating there, followed by Lebanon (6 per cent) and Pakistan (6 per cent). The cannabis resin from those countries is principally used to supply markets in the Near and Middle East and South-West Asia, although cannabis resin originating in Afghanistan has also been identified in Central Asia, Eastern Europe and Western and Central Europe. The Islamic Republic of Iran also reported Afghanistan as the primary source of the cannabis resin on its market. According to the country's authorities, in 2017, about 90 per cent of cannabis resin entered the Islamic Republic of Iran via Pakistan and only 10 per cent came directly from Afghanistan. Most (60 per cent) of the cannabis resin was trafficked by land and 39 per cent was shipped by sea, mainly on boats that had begun their journey in Pakistan. In 2017, some 55 per cent of the cannabis resin smuggled out of the Islamic Republic of Iran was destined for countries on the Arabian Peninsula, 25 per cent was destined for Turkey and the Caucasus and 20 per cent was for domestic consumption. Cannabis resin from Lebanon is mainly found in the Near and Middle East and, to a lesser extent, in Western and Central Europe.

Demand for cannabis

Global prevalence of cannabis use has remained stable in recent years, despite an increase in the number of cannabis users

Cannabis continues to be the most widely used drug worldwide. UNODC estimates that roughly 3.8 per cent (range: 3.3–4.4 per cent) of the global population aged 15–64 years used cannabis at least once in 2017, the equivalent of some 188 million people (range: 164–219 million). The average global prevalence of cannabis use increased over the period

FIG. 13 Global trends in number of cannabis users and qualitative information on trends in cannabis use,[a] 1998–2017



Source: UNODC, responses to the annual report questionnaire.

[a] *The index is based on information of, on average, 83 countries per year over the period 1998–2017. Two points were given for "large increase", 1 point for "some increase", 0 for "stable", -1 for "some decrease" and -2 for "large decrease". For reference, if all countries had reported each year "some increase" in cannabis use over the period 1998–2017, the cannabis use perception index would have reached 1,584 points in 2017. For details on the perception index calculations, refer to the methodological annex, available in the online version of the present report.*

1998–2007, from 3.4 to 3.9 per cent, before remaining basically stable during the subsequent decade.

The overall number of annual cannabis users is estimated to have increased by roughly 30 per cent during the period 1998–2017. Since 2009, the past-year prevalence of cannabis use has increased by some 4 per cent, while the number of cannabis users has increased by around 19 per cent, reflecting in part an increase in the global population, which had increased by 10 per cent over the same period. This increase should be interpreted with caution, however, because of the wide margins of error around the estimation of prevalence and of the number of cannabis users. Nevertheless, qualitative information on changes in cannabis use, as reported by an average of 74 Member States per year, confirms the increase in cannabis use over the period 2007–2017.

Cannabis use in Africa and Asia

In Africa, the annual prevalence of cannabis use in 2017 is estimated at 6.4 per cent of the population aged 15–64, corresponding to 44.9 million past-year users. Within the region, the subregion West and Central Africa has the highest prevalence of use, at nearly 10 per cent, or an estimated 27 million past-year users. Recent estimates of cannabis use are only available from two countries in Africa, however. In Kenya, the annual prevalence of cannabis use is estimated at 1.2 per cent (2016) of the adult population, whereas in Nigeria it is estimated at 10.8 per cent, corresponding to 10.6 million past-year cannabis users. Cannabis use in Nigeria is more prevalent among men (annual prevalence of 18.8 per cent) than women (2.6 per cent) and among adults aged 29–34 years.[14]

The estimate for cannabis use in Asia is much lower than in other regions, nearly at 2 per cent annual prevalence, yet, owing to the size of the population, nearly one third of estimated global cannabis users (54 million) reside in the region. In Pakistan, for example, the past-year prevalence of cannabis use was estimated at around 3.6 per cent of the adult population, or nearly 4 million past-year users.[15] In India, more than 3 per cent of the population aged 18 and older, and less than 1 per cent of adolescents aged 10-17, had used any cannabis product in the past year in 2018. This included the use of "bhang",[16] the most commonly used variant of cannabis in India, as well as cannabis herb and resin. Overall, the past-year use of cannabis was higher among men (5 per cent) than women (0.6 per cent) and in the states of Uttar Pradesh, Punjab, Sikkim, Chhattisgarh and Delhi than in other states. Nearly 0.7 per cent of the total population (aged 10–75) was considered to be suffering from cannabis use disorders.[17]

In the absence of survey data that would allow for a robust analysis of trends, it can be surmised, on the basis of the cannabis use perception index, that cannabis use increased in Africa and Asia over the period 2010–2017. In addition, an increase in cannabis use was reported, on the basis of qualitative

14 UNODC, *Drug Use in Nigeria 2018* (Vienna, 2019).

15 Ministry of the Interior and Narcotics Control of Pakistan and UNODC, *Drug Use in Pakistan 2013* (Islamabad, 2014).

16 Bhang is an edible preparation of cannabis used in food and drink and traditionally distributed during the festival of Holi. Bhang is legal in many states in India.

17 Atul Ambekar and others, "Magnitude of Substance Use in India", (New Delhi, Ministry of Social Justice and Empowerment, 2019).

information, by almost all the countries in Africa that returned the annual reports questionnaire in 2016 and 2017. Similarly, qualitative information reported by many countries in nearly all of the subregions of Asia suggested an increase in cannabis use in 2016 and 2017.

Cannabis use is still on the increase in North America

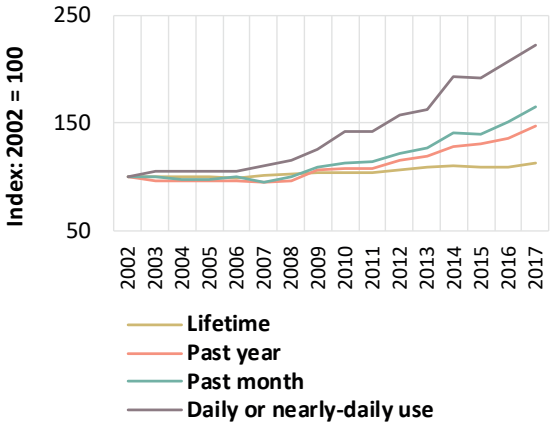
Past-year cannabis use increased in the Americas from 42 million people in 2007, or 7.0 per cent of the population aged 15–64,[18] to 57 million people in 2017, or 8.4 per cent of the population aged 15-64. The increase was most pronounced in the United States where, after some minor decreases at the beginning of the 2000s, annual cannabis use increased from 9.9 per cent in 2007 to 15.3 per cent in 2017.[19] High levels of cannabis use have also been reported in Canada, where past-year cannabis use was reported by 14.7 per cent[20] of the population aged 15 and older in 2015, up from 10.7 per cent in 2013[19] and 9.1 per cent in 2011.[20]

Cannabis use continues to increase in the United States

Change in the cannabis market in the United States has occurred in terms of the number of users, but more dramatically in the frequency of use and quantities of cannabis consumed. While the lifetime prevalence of cannabis use among the adult population (aged 18 and older) in the United States increased by 10 per cent over the period 2002–2017, the past-year and past-month use of cannabis increased by 50 per cent and 65 per cent, respectively.[21] However, the most pronounced increase in cannabis use is among those who are daily or near-daily users of cannabis – a proportion that has doubled. In 2017, over 24 million people aged 18 or over were estimated to be past-month users of cannabis; of them, more than 40 per cent, or over 10 million people, were daily or near-daily[22] users of cannabis. Consumption data from states such as Colorado, where the non-medical use of cannabis has been legalized, indicate, daily or near-daily users of cannabis accounted for 80 per cent of the quantity of cannabis consumed in 2017.[23] As noted in earlier editions of the *World Drug Report*, the expansion in the use of cannabis in the United States has occurred in a context of ongoing policy debates over legalizing the non-medical use of cannabis; drastic policy changes; media coverage of the legalization debate, in which the medical benefits of cannabis have been frequently highlighted;[24] and a decrease in the number of people perceiving cannabis use as a risk to health.

In the United States, 3 million people aged 12 years or older initiated cannabis use in 2017, which is significantly more than in 2016 and in 2002. The

FIG. 14 Trends in cannabis use among the adult population (aged 18 and older) in the United States of America, 2002–2017



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2017 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2018).

18 *World Drug Report 2009* (United Nations publication, Sales No. E.09.XI.12).

19 Results from the *National Survey on Drug Use and Health 2017*.

20 UNODC, annual report questionnaire data based on the *Canadian Tobacco, Alcohol and Drugs Survey 2015*.

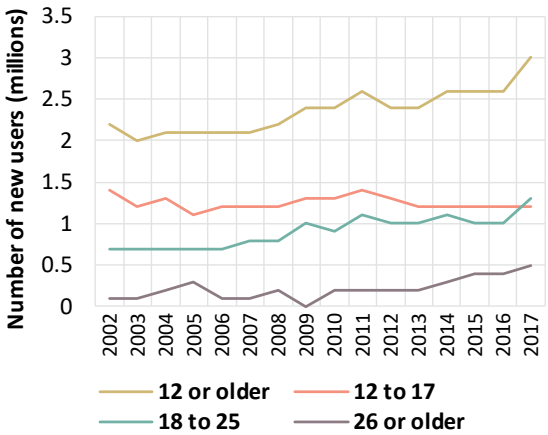
21 *Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health*.

22 Daily or near-daily use is defined as use of a substance for 20 days or more in month.

23 Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Colorado, Marijuana Policy Group, August 2018).

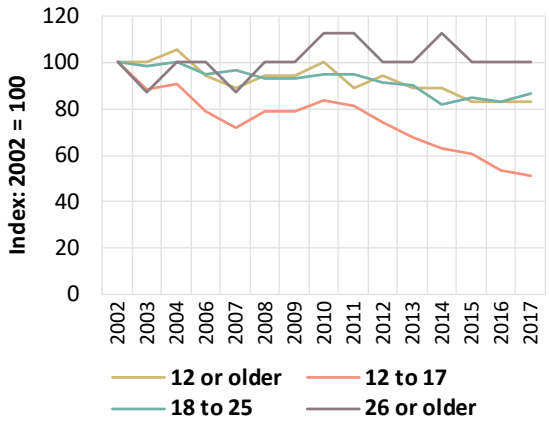
24 See, for example, Hwalbin Kim, "Framing marijuana: a study of how us newspapers frame marijuana legalization stories and framing effects of marijuana stories", Doctoral dissertation, University of South Carolina, 2017.

FIG. 15 Past-year cannabis use initiation among the population aged 12 and older in the United States, 2002–2017



Source: United States, Substance Abuse and Mental Health Services Administration, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health*, HHS Publication No. SMA 18-5068, NSDUH Series H-53, (Rockville, Maryland 2018).

FIG. 16 Cannabis use disorders in the United States, 2002–2017



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2017 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2018).

most significant increase in the number of cannabis initiates was among those aged 18 and older.[25]

While cannabis use disorders have remained fairly stable among the population aged 12 and older since 2002 and have been declining among those aged 12–17, there was a statistically significant increase in cannabis use disorders in 2017 among those aged 18–25 years.

The annual prevalence of cannabis use among high-school students increased significantly in 2017 compared with the previous year: from an annual prevalence of 9.4 per cent among 8th grade students in 2016 to 10.1 per cent in 2017; from 23.9 per cent among 10th grade students in 2016 to 25.5 per cent in 2017; and from 35.6 per cent among 12th grade students in 2016 to 37.1 per cent in 2017. However, these values are lower than the annual prevalence in 2002 for 8th and 10th grade students.[26] By contrast, the past-month and daily and near-daily use of cannabis also showed signs of an increase among 10th grade students from 2016 to 2017. The National Survey on Drug Use and Health reported a stable trend over the period 2016–2017 in past-year and past-month cannabis use among those aged 12–17.

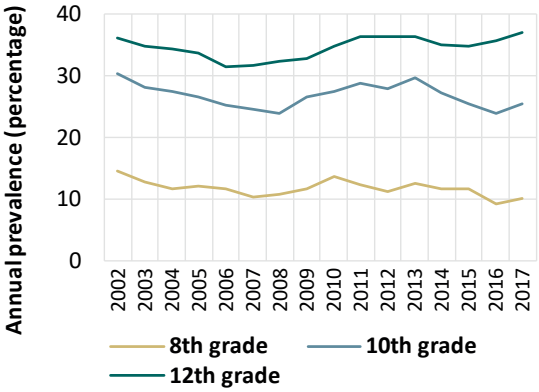
Young people who do not attend college seem to be more vulnerable to frequent cannabis use than high-school graduates who attend college. In 2017, cannabis use was much higher among high school graduates aged 19–22 who attend college than among those who do not attend college,[27] and the proportional difference between the college students and their peers increased by measures of more frequent use: annual prevalence of cannabis use among the college students was 38 per cent, compared with 41 per cent among those who were not in college. Similarly, past-month cannabis use was 21 per cent among the college students, compared with 28 per cent among those who were not in college. The rate of daily cannabis use was three times higher for the group of young people not in college (13.2 per cent), compared with the group of college students (4.4 per cent).

25 *Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health.*

26 United States, National Institute on Drug Abuse, "Trends in Prevalence of Various Drugs", Monitoring the Future Study (revised December 2018). Available at www.drugabuse.gov/trends-statistics/monitoring-future/monitoring-future-study-trends-in-prevalence-various-drugs.

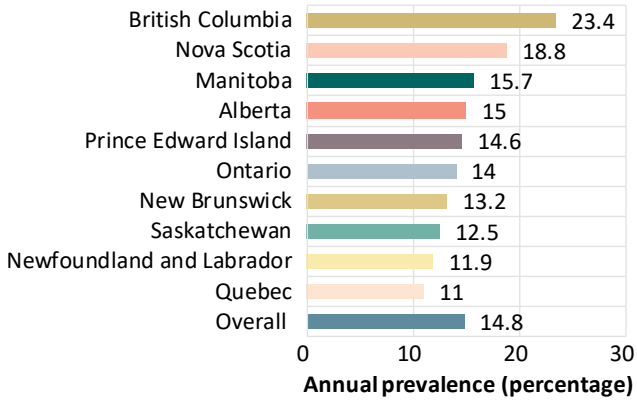
27 John E Schulenberg and others, *Monitoring the Future National Survey Results on Drug Use, 1975–2017: Volume II, College Students and Adults Ages 19–55* (Institute for Social Research, The University of Michigan, 2018).

FIG. 17 Cannabis use among high-school students in the United States, 2002–2017



Source: Lloyd D. Johnston and others, *Monitoring the Future National Survey Results on Drug Use: 1975-2017: Overview, Key Findings on Adolescent Drug Use* (Institute for Social Research, The University of Michigan, 2018).

FIG. 18 Cannabis use among the population aged 15 and older in Canada, by province, 2017



Source: Canada, Health Canada, "Canadian Tobacco, Alcohol and Drugs Survey (CTADS): summary of results for 2017" (updated 4 January 2019). Available from www.canada.ca/en/health-canada/services/canadian-tobacco-alcohol-drugs-survey/2017-summary.html.

Note: Health Canada does not provide analysis of drug use in the territories (Northwest Territories, Nunavut and Yukon).

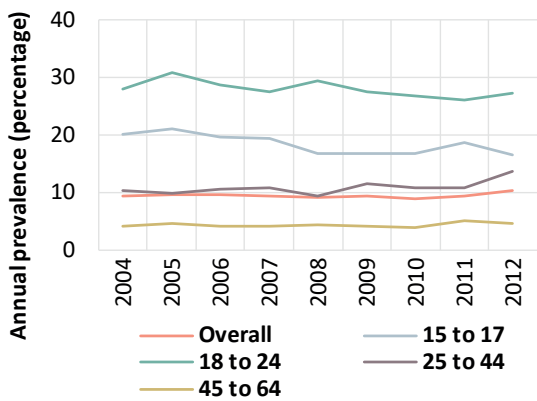
Cannabis use in Canada also continues to increase

In North America, comparatively high levels of cannabis use have also been reported in Canada. Past-year prevalence of cannabis use in 2017 was 15 per cent (4.4 million people) among the population aged 15 and older, of whom 37 per cent reported using cannabis for medical purposes. Past-year use of cannabis among the general population has increased by 25 per cent since 2015. As in other countries, past-year use of cannabis is reported to be higher among young people (aged 15–19) (19 per cent annual prevalence) and those aged 20–24 (33 per cent annual prevalence) than those aged 25 or older (13 per cent annual prevalence). In 2017, nearly one quarter of past-year users, or 1 million people, were daily or near-daily users of cannabis.[28]

While cannabis users reported using more than one mode of cannabis consumption, smoking was the most common (91 per cent) in Canada in 2017. Mixing cannabis with tobacco (22 per cent), "chasing" (smoking a tobacco product right after smoking cannabis) (34 per cent) and consuming cannabis in edibles such as brownies (38 per cent) were also reported.[29] Past-year cannabis use was reported to be above the national average in British Columbia, Nova Scotia and Manitoba.

When looking at the long-term trend, cannabis use in Canada remained stable between 2004 and 2011, at about 9 per cent annual prevalence among the general population aged 15 and older, but it increased each year thereafter: past-year cannabis

FIG. 19 Cannabis use in Canada, by age group, 2004–2012



Source: Canadian drug use monitoring survey (CADUMS), 2004–2012.

28 Canada, Health Canada, "Canadian Tobacco, Alcohol and Drugs Survey (CTADS): summary of results for 2017" (updated 4 January 2019). Available from www.canada.ca/en/health-canada/services/canadian-tobacco-alcohol-drugs-survey/2017-summary.html.

29 Ibid.

THC and CBD: the importance of considering both

The principal cannabinoids in the cannabis plant are THC, CBD and CBN. As they occur in the plant, all three are also known as phytocannabinoids, as opposed to endocannabinoids (anandamide and 2-AG), which occur naturally in the body. Among them, THC is considered to be the primary substance that causes the psychoactive effects sought by cannabis users. THC and its synthetic preparation dronabinol are used medically for the management of conditions such as anorexia associated with weight loss in patients with acquired immune deficiency syndrome (AIDS), nausea and vomiting associated with chemotherapy for cancer, and for chronic pain related to conditions such as multiple sclerosis and for neuropathic pain. Used non-medically, in a healthy person, THC can induce psychotic symptoms and anxiety and can impair memory and psychomotor control,[a] whereas in patients with schizophrenia, THC may exacerbate existing psychotic symptoms, anxiety and memory impairments. THC is therefore considered as the main cannabinoid responsible for the development of mental health disorders in long-term, heavy users of cannabis. One plausible reason for an increased risk of developing mental health disorders, including schizophrenia,[b] among long-term cannabis users is that cannabinoids such as THC may interfere with the neurodevelopmental roles of endocannabinoids.[c] The effects of CBD, on the other hand, are considered to be the opposite of those of THC; CBD has anxiolytic and anti-psychotic properties.[d]

Over the past decade, an increasing number of cannabis products that are considered to have high levels of potency have been introduced onto the cannabis market. These products tend to be high in THC and low in CBD. In Europe, for example, the mean THC content of cannabis resin doubled from about 8 per cent in 2006 to 17 per cent in 2016, and the THC content of cannabis herb increased from 5 per cent to 10 per cent over the same period.[e] In the State of Colorado, in the United States, cannabis flower is reported as having a THC content of 20 per cent and cannabis concentrates of 69 per cent.[f] As the scientific literature suggests, such potent cannabis may predispose cannabis users, in particular those who are long-term, high-frequency users, to cannabis use disorders and associated psychiatric comorbidity.[g] Moreover, it is considered that, when CBD and THC are co-administered in balanced proportions, CBD may be able to reduce some of the effects of THC, such as anxiety and paranoia.[h]

[a] Deepak Cyril D'Souza and others, "Delta-9-tetrahydrocannabinol effects in schizophrenia: implications for cognition, psychosis, and addiction", *Biological Psychiatry*, vol. 57, No. 6 (March 2005), pp. 594–608.

[b] Marta Di Forti and others, "The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicentre case-control study", *The Lancet Psychiatry*, 19 March 2019.

[c] Hui-Chen Lu and Ken Mackie, "An introduction to the endogenous cannabinoid system", *Biological Psychiatry*, vol. 79, No. 7 (April 2016), pp. 516–525.

[d] Franjo Grotenhermen, Ethan Russo and Antonio Waldo Zuardi, "Even high doses of oral cannabidiol do not cause THC-like effects in humans: comment on Merrick et al. *Cannabis and Cannabinoid Research 2016*", *Cannabis and Cannabinoid Research*, vol. 2, No. 1 (2017).

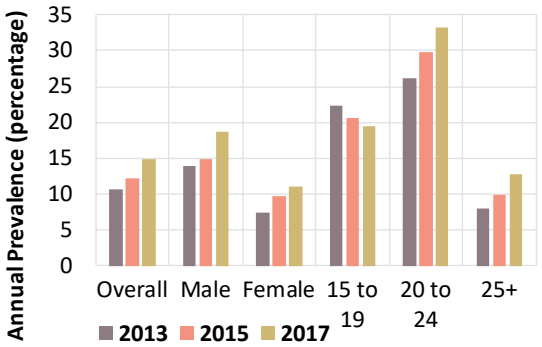
[e] Tom P. Freeman and others, "Increasing potency and price of cannabis in Europe, 2006–16" *Addiction*, 29 December 2018.

[f] For trends in the potency of cannabis products, see the section on development of cannabis markets in different states in the United States in the present booklet.

[g] Darby J. E. Lowe and others, "Cannabis and mental illness: a review", *European Archives of Psychiatry and Clinical Neuroscience*, vol. 269, No. 1 (2019), pp. 107–120.

[h] Sagnik Bhattacharya and others, "Opposite effects of Δ-9-tetrahydrocannabinol and cannabidiol on human brain function and psychopathology", *Neuropsychopharmacology*, vol. 35, No. 3 (February 2010), pp. 764–774.

FIG. 20 Cannabis use in Canada, by sex and age group, 2013–2017



Source: Canada, Health Canada, "Canadian Tobacco, Alcohol and Drugs Survey (CTADS): summary of results for 2017" (updated 4 January 2019).

Note: The Canadian Tobacco, Alcohol and Drugs Survey was initiated as a biennial survey on tobacco, alcohol and drugs in 2013 and replaced the earlier CADUMS (Canadian drug use monitoring survey); therefore, the results of the two are not entirely comparable, in particular, across age groups.

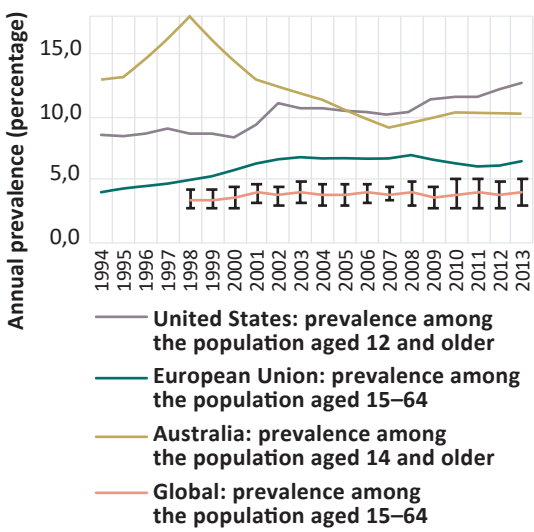
use increased by 40 per cent between 2013 and 2017. This is largely a result of a decrease in the perception of risk around cannabis use and of the national debate about legalizing non-medical use of cannabis.[30, 31] The increase in cannabis use in Canada since 2013 has been more pronounced among adults (aged 20 or older) while it has declined among young people (aged 19 or younger).

Cannabis use remains relatively stable in Oceania and Europe

While Canada and the United States have experienced significant increases in cannabis use in the past decade, the trend in Oceania has been different. Annual prevalence of cannabis use in Oceania, most notably in Australia, was substantially higher than in the United States in the 1990s, but it decreased dramatically, from almost 18 per cent of the population aged 14 and older in 1998 to roughly 10 per cent a decade later. It has remained at that level throughout the past decade, at almost 4 percentage points below the level reported in the United States.

Cannabis use in countries in Western and Central Europe has fluctuated over the past decade, with 6–7 per cent of the population aged 15–64 having used cannabis in the past year. The highest annual prevalence of cannabis use in Western and Central Europe in recent years has been reported by France (11.1 per cent in 2016), Italy (10.2 per cent in 2017), Spain (9.5 per cent in 2015), Czechia (9.5 per cent in 2016), Netherlands (9.2 per cent in 2017) and Switzerland (9.1 per cent in 2016). Among the six countries that provided data on cannabis use in 2017, five reported an increase since the last survey. Past-month use of cannabis in Western and Central Europe (primarily European Union member States) is estimated at around 3.1 per cent of the population aged 15–64 in 2017; on average less than 1 per cent of the population aged 15-64 are estimated to be daily or near-daily users of cannabis. The prevalence of cannabis use remains high among young adults (aged 15–34), with an average past-month prevalence of 5.4 per cent; 1.2 per cent of young adults were daily or near-daily users of cannabis in 2017.[32]

FIG. 21 Cannabis use in Australia, the United States of America, the European Union and globally, 1994–2017



Sources: UNODC, responses to the annual report questionnaire; EMCDDA; Substance Abuse and Mental Health Services Administration (United States), EMCDDA; and Australian Institute of Health and Welfare.

30 Anna McKiernan and Katie Fleming, *Canadian Youth Perceptions on Cannabis* (Ottawa, Canadian Centre on Substance Abuse, 2017).

31 Eldon Spackman and others, "Marijuana use and perceptions of risk and harm: a survey among Canadians in 2016", *Healthcare Policy*, vol. 13, No. 1 (August 2017).

32 EMCDDA, "Prevalence of drug use", Statistical Bulletin 2018.

Synthetic cannabinoid receptor agonists and their trends

Synthetic cannabinoid receptor agonists, also known as synthetic cannabinoids, are substances designed to mimic the desired effects of cannabis and act on CB1 and CB2 receptors;[a] these substances can include wide-ranging and chemically diverse substances. Many of them were used widely in pharmaceutical research for several decades and were not considered suitable for human consumption. Outside of pharmaceutical research, synthetic cannabinoids were present in the market until 2004, when they began appearing in advertisements for herbal preparations in, for example, Europe and North America.[b] Synthetic cannabinoids are typically soaked into or sprayed onto plant material, which itself did not contain substances with psychoactive effects. Many synthetic cannabinoids were sold as smokable "herbal blends" and "legal highs" under a variety of brand names, such as "Spice", "K2" and "Kronic", and labelled "not for human consumption".[c] Since UNODC began monitoring NPS in 2009, synthetic cannabinoids have been one of the main categories of substances reported as NPS identified in national markets.

Most persistent cannabinoid receptor agonists that were reported to UNODC over the period 2012–2018 and have remained on the market

5F-APINACA; AB-FUBINACA; AB-PINACA; ADB-FUBINACA; AM-2201; APINACA; JWH-018; JWH-081; JWH-122; JWH-203; JWH-210; JWH-250; MAM-2201; PB-22; QUCHIC; RCS-4; UR-144; XLR-11.

It remains challenging to determine the prevalence of use of any particular cannabinoid receptor agonists, since in most instances users are unaware of the kind of synthetic cannabinoid they are using. Moreover, the use of synthetic cannabinoids, in many instances after these substances have been put under national control, remains more common and problematic among marginalized groups, especially among people who are homeless or in prison.[d]

Many synthetic cannabinoid receptor agonists have been associated with acute cases of intoxication and even death in some instances.[e] Overall, the acute psychological effects of synthetic cannabinoids may resemble those reported during acute intoxication with cannabis (THC), which can range from euphoria to distress and anxiety. Along with distorted perceptions of time, hallucinations and paranoia, psychiatric disorders may also occur.[f] For example, case studies of acute administration of and intoxication with ADB-FUBINACA suggest that the substance may have contributed to severe adverse reactions such as agitation, confusion, hypertension, tachycardia and even death.[g, h] Another case study looked at the rapid death of an individual who had used ADB-FUBINACA. The autopsy showed the cause of death to be coronary arterial thrombosis in combination with the use of ADB-FUBINACA.[i] In 2015, Poland registered an outbreak of intoxications with a substance called "mocarz", which contained frequently changing synthetic cannabinoids. Many of the "mocarz" samples contained a variety of synthetic cannabinoids, including UR-144, XLR-11, BB-22, 5F-PB-22 and MDMB-CHMICA. One of the victims reported to have died from multiple organ failure and was found to have MDMB-CHMICA in the body.[j]

While the non-medical use of natural cannabis and its products is common, and natural cannabis remains the principal type of cannabis consumed, synthetic cannabinoid receptor agonists continue to proliferate in many subregions, as reported through the UNODC early warning advisory. Owing to the unknown chemical structure of many synthetic cannabinoid receptor agonists and therefore their potential harm, their use always carries the risk of acute intoxication and other adverse public health effects.

a Nicola J Kalk and others, "Spice and all things nasty: the challenge of synthetic cannabinoids" *BMJ*, vol. 355, No. 8079 (October 2016).

b EMCDDA, "Synthetic cannabinoids in Europe", Perspectives on Drugs series (Lisbon, 6 June 2017).

c *World Drug Report 2017*, Booklet 4: *Market Analysis of Synthetic Drugs*.

d Ibid.

e "Synthetic cannabinoids in Europe".

f Francois R. Lamy and others, "Increases in synthetic cannabinoids-related harms: results from a longitudinal web-based content analysis", *International Journal of Drug Policy*, vol. 44 (June 2017), pp. 121–129.

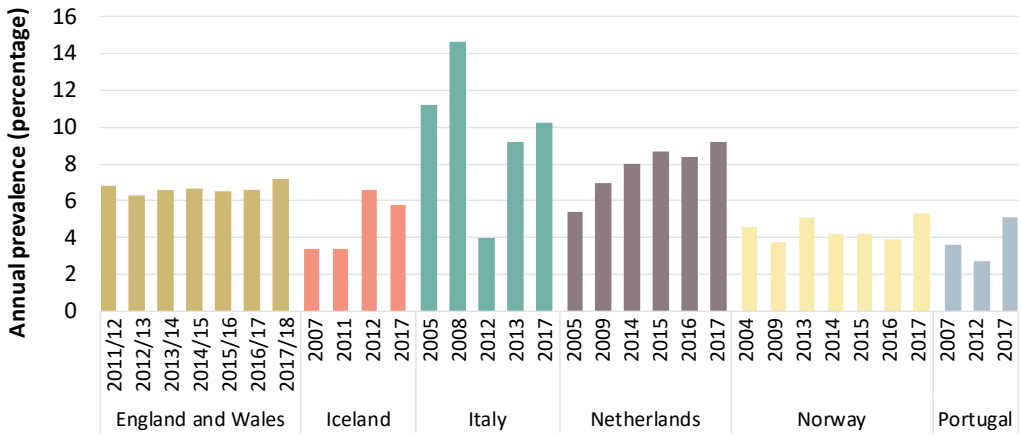
g Nicklaus Brandehoff and others, "Synthetic cannabinoid 'Black Mamba' infidelity in patients presenting for emergency stabilization in Colorado: a P SCAN cohort", *Clinical Toxicology*, vol. 56, No. 3 (2018), pp. 193–198.

h Rex Pui Kin Lam and others, "Supraventricular tachycardia and acute confusion following ingestion of e-cigarette fluid containing AB-FUBINACA and ADB-FUBINACA: a case report with quantitative analysis of serum drug concentrations", *Clinical Toxicology*, vol. 55, No. 7 (April 2017), pp. 662–667.

i Kevin G. Shanks, William Clark and George Behonik, "Death associated with the use of the synthetic cannabinoid ADB-FUBINACA", *Journal of Analytical Toxicology*, vol. 40, No. 3 (April 2016), pp. 236–239.

j UNODC, Laboratory and Scientific Section Portals, "Poland: "Mocarz" intoxications now linked to synthetic cannabinoid MDMB-CHMICA" (March 2016).

FIG. 22 Cannabis use in selected countries in Western Europe



Source: UNODC, responses to the annual report questionnaire.

Developments in measures regulating the non-medical use of cannabis

As of March 2019, legal provisions allowing the non-medical use of cannabis have been approved in Canada and Uruguay as well as in 10 jurisdictions in the United States. The common feature of the legislation is that it generally allows for the production and sale of cannabis products for non-medical use in the relevant jurisdictions. However, there are differences in the level of regulation and control of the non-medical use of cannabis and the different regulations that are being implemented in different local contexts and dynamics are likely to have a different impact within each jurisdiction on the development of cannabis markets, the extent of non-medical use of cannabis and other public health, safety and criminal justice outcomes.

This section contains a description of the different features and status of legislation and regulations on the non-medical use of cannabis in Canada, Uruguay and jurisdictions in the United States. For the United States, the section covers the main features of cannabis regulations and some state-level differences in the regulation of cannabis markets. It also covers the development of a cannabis market in some of the states where information was available. The section also presents the main features of the federal law passed by the Government of Canada in 2018 that legalized the non-medical use of cannabis, as well as the division of responsibilities at the federal and state levels in regulating the non-medical use of cannabis in Canada.[33]

Cannabis regulations and their implementation in the United States

By the end of 2018, a total of 33 states, as well as the District of Columbia, Guam and Puerto Rico, had approved or had in place a comprehensive public medical cannabis programme. As of 2019, 10 state-level jurisdictions in the United States,[34] plus the District of Columbia, allow the non-medical use of cannabis.[35, 36] In 2018, Michigan and Vermont were the two states in which legislation allowing the non-medical use of cannabis had been approved. While the non-medical use of cannabis was legalized through voters' initiatives in the other jurisdictions, Vermont is the only state that legalized it through state legislature. It is worthy of note that all the states that have legalized the non-medical use of cannabis had prior measures permitting the medical use of

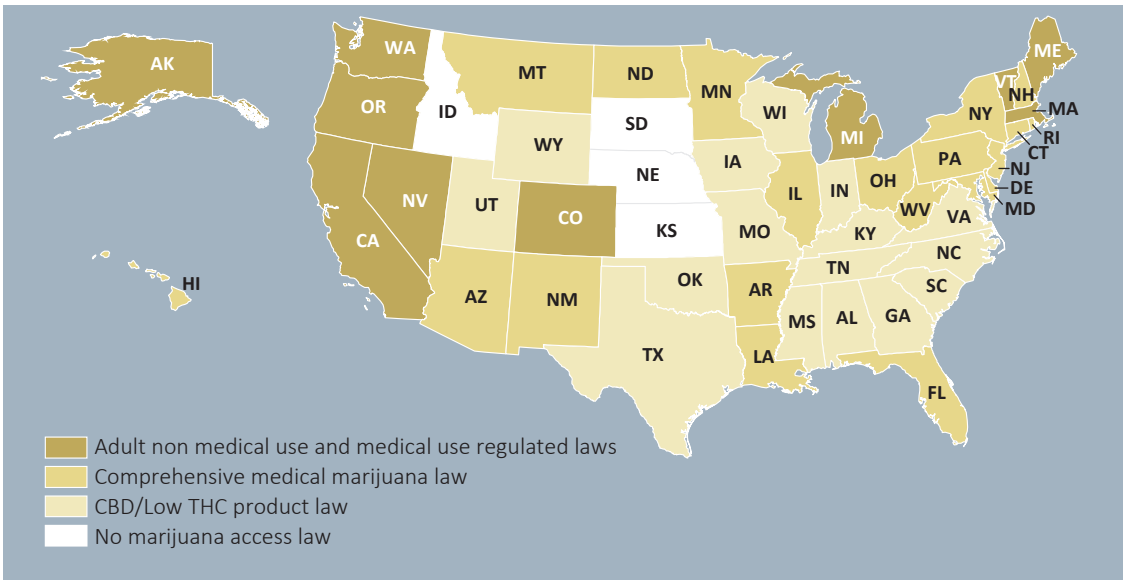
33 For details of different measures in each of the jurisdiction, see table 2 on pages 36–43 of the present booklet.

34 In the United States, cannabis is federally prohibited as a substance in schedule I of the Controlled Substances Act.

35 Home cultivation is not allowed in the State of Washington. The number of plants allowed in each state varies.

36 National Conference of State Legislatures, "Marijuana overview", 14 December 2018.

MAP 1 Jurisdictions in the United States that allow non-medical use of cannabis, medical use of cannabis and those that do not allow access to cannabis, December 2018



Source: National Conference of State Legislatures, "Marijuana overview", 14 December 2018.

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

cannabis. In fact, in states such as Colorado, the initial applications for recreational cannabis licences were restricted to businesses that were already licensed to sell cannabis for medical purposes.

Cannabis regulations in the United States are not implemented uniformly in each state

The level of implementation of the legislation permitting the non-medical use of cannabis varies across state jurisdictions and may even include different approaches within the same jurisdiction. For example, some states that have legalized the non-medical use of cannabis allow city administrations to formulate their own cannabis regulations and give options to cities and neighbourhoods within those cities to opt out and not permit the sale of cannabis. In Colorado, 25 of the state's 64 counties allow some form of business activity related to the non-medical use of cannabis, which may include only allowing cannabis dispensaries to operate, allowing cannabis production, setting a limit on licensing new businesses, or a combination of those. The remaining counties in Colorado have either a complete ban or a moratorium in place. In Oregon, of the state's 36 counties, 20 allow the sale of cannabis for non-medical use and 16 have banned it. In California, the largest state to legalize the non-medical use of cannabis, less than 20 per cent of cities, i.e., 89 out of 482 cities, allow retail shops to sell cannabis for non-medical use.[37] Moreover, fewer than one in five cities in California allow the sale of cannabis for medical purposes, which has been legal in the state for almost 22 years. In Michigan, the municipalities can place harsher restrictions on cannabis businesses than the state legislation. Such restrictions may include capping the number of licences or banning the commercial production and sale of cannabis for non-medical use altogether. Residents can also petition their town for such ordinances.

Regulation of the cannabis market is similar to the regulation of the alcohol market

All the states that have measures allowing the non-medical use of cannabis regulate the cannabis market in a manner similar to that of the alcohol market; for instance, by prohibiting the sale of cannabis to people under 21 years of age or by licensing

37 Patrick McGreevy (Tribune News Service), "Legal pot sales fall short of expectations in California", Governing: the States and Localities, 3 January 2019.

commercial enterprises to produce, market and sell a wide range of cannabis products. Some states, such as Alaska, Oregon and Washington, have added cannabis market regulation to the existing alcohol or liquor boards. In California, Colorado and Massachusetts, cannabis regulatory bodies have been established and in Nevada and Michigan, the cannabis market is regulated by the departments of revenue or taxation. Maine is the only state where cannabis regulation is overseen by the Department of Agriculture, Conservation and Forestry. At the time of writing, the regulatory system for the production or sale of cannabis for non-medical use in Vermont had not been set up.

Different limits for possession and home cultivation of cannabis

With the exception of the District of Columbia and Maine, which permit the possession of larger quantities, most of the states allow for the possession of up to 28.5 g of cannabis. In addition, all states permit the home cultivation of around six plants, with a varying number of plants that can be flowering; Michigan, which allows for the home cultivation of up to 12 plants, is an exception. The conditions allowing home cultivation of cannabis vary but may include measures such as plants having to be grown out of public view or cultivation being subject to the permission of the house owners or other tenants in the building or to neighbourhood zoning laws.

Taxes levied on cannabis differ considerably

In general, the pricing of and taxes levied on cannabis products are based on different considerations and essentially adhere to Laffer curve criteria.[38] When states make decisions on how to tax cannabis, one consideration is to maintain a price that is more attractive than that on the "black market" in order to prevent organized crime groups from generating profits from the illicit trade in cannabis and for the State authorities themselves to generate revenue from cannabis sales. Part of that revenue is utilized for implementing the regulatory framework and investing in public health initiatives to address the harm caused by the non-medical use of cannabis. Another consideration is that the price of cannabis products (including taxes) needs to be low enough to displace the illegal cannabis market, but not so low that it encourages more and more frequent use of cannabis. On the basis of these considerations, all states have put together an elaborate structure of taxation and revenue collection from the cultivation, production and sale of cannabis. Current tax rates range from about 10 to 37 per cent across states, although several states have recently changed their tax rates and/or structures.[39] Currently, at 37 per cent, Washington State levies the highest sales tax. Colorado imposes a 15 per cent excise tax on cultivation and used to impose a 10 per cent cannabis retail sales tax until it was lowered to 8 per cent in July 2017. It also imposes an additional 2.9 per cent state sales tax and up to 3.5 per cent local sales tax. City-level jurisdictions can also impose their own local taxes on the sale of cannabis.

Advertising cannabis products

All of the states in which the use of cannabis is legalized have some degree of restriction on the advertising of cannabis products. For example, in California, advertising can only be directed at people aged 21 or older, there are restrictions on false claims that can be made relating to health benefits, and product labels cannot be appealing to children. In Colorado, advertising is restricted to media with audiences that comprise no more than 30 per cent of people under the age of 21. In some states, such as Washington, advertisements cannot depict cartoon characters and pictures that could be appealing to children.

Product proliferation

With regard to cannabis products and pricing in the states that have implemented measures for the non-medical use of cannabis, there has been a proliferation of products that include flowers, pre-rolled joints, vaporizers (vaping cannabis), concentrates and edibles such as cakes and soda drinks. The potency of those products can vary across states and, while

38 The Laffer curve, defined as the relationship between the tax rate and total revenue raised, is usually considered in macroeconomics to describe the relationship between income taxes and labour supply. A similar relationship has been applied to commodity taxes, as the tax pushes the price upwards, ultimately reducing demand. Arthur B. Laffer described this relationship (1985), although the concept is originally credited to Dupuit (1844).

39 For details of taxation in each state, see table 3 on pages 44–49 of the present booklet.

many states have facilities for monitoring potency, the increasing potency of cannabis products, in particular, products other than those made from cannabis flower, may be a public health concern as there are generally no restrictions on the potency of cannabis products.

Development of cannabis markets in different states in the United States

Prices of cannabis products in different states have also been fluctuating, which is a reflection of the competitiveness of the markets where the demand for cannabis products and the cultivation and production of cannabis are on the increase. It has been argued that there is still a residual illicit cannabis market in Washington and Colorado.[40, 41] The market for the non-medical use of cannabis has evolved in terms of the pricing and sale of cannabis products, changes in the potency of products and patterns of consumption of non-medical use. Since Colorado has a longer-standing cannabis market than other states, for both the medical and non-medical use of cannabis, with more long-term trend data, the examples in the present section are primarily taken from Colorado.

Decreasing prices in some jurisdictions have led to an increase in the demand for and sale of cannabis and related revenue

Colorado and Washington were the first states to legalize the non-medical use of cannabis. In both states, cannabis prices have decreased considerably since the inception of the drug's legal sale. In Colorado, the prices of cannabis for non-medical use are declining in general. From 2014 to 2017, the average annual price of cannabis flower decreased by 62 per cent, from $14.05 per gram (weighted average) in 2014 to $5.34 in 2017.[42] Over the same period, the price of cannabis concentrates decreased by 47.9 per cent, from $41.43 per gram to $21.57. The price of infused edible products has hovered around $18 per 100 mg package but has not exhibited a consistent trend over time. In the State of Washington, the price per gram of flower (pre-tax) decreased by 77 per cent, from $17.23 per gram in 2014 to $5.18 in October 2017. The decrease in retail prices is considered to reflect a competitive market in which both cultivators and retailers are constantly vying for business, although the decrease has also led to an increase in demand, sales and tax revenue. Thus, one concern in the State of Washington has been an oversupply of cannabis in the market because of overproduction: the area available for cannabis production was initially capped at 2 million square feet and later raised to 8 million square feet, and the number of licences for retail outlets, which was initially capped at 334, increased to 556 by January 2016.[43] During the period January to November 2018, total sales of different cannabis products were estimated at $1.4 billion in Colorado. The average retail price of inhalable products, which accounted for 80 per cent of total sales, decreased by 10 per cent; the average retail price of ingestibles (edibles) increased by 9 per cent; and the price of topical cannabis products by 10 per cent.[44]

Overall, according to a study of the market size and demand for cannabis in Colorado, while the price for marijuana is falling gradually, the price of a "standard serving" of THC has declined more rapidly. It is unclear whether this is a long-term trend that will lead to a "high THC/low price" paradigm, or whether the market price will stabilize to suggest an equilibrium.[45]

In the states of California, Colorado and Oregon, where price and sales monitoring data were available, combined sales reached $4.2 billion during the period January to November 2018. While prices mostly decreased in Colorado and Oregon, the trend was different in California (see the next subsection).

In 2017, based on sales data in Colorado, the principal demand for cannabis products for non-medical

40 Nicholas P Lovrich and other, "Learning from the legalization of recreational marijuana: a preliminary assessment of Washington State's experience", presented at Annual Meeting of the Academy of Criminal Justice Scienes, 2019 in Baltimore, USA

41 Jonathan P. Caulkins and others, "Triangulating web and gerneral population surveys: how well do results match legal cannabis market sales?", presented at annual conference of the International Society for the Study of Drug Policy, held in Vancouver, Canada, from 16 to 18 May 2018.

42 Orens and others, "Market size and demand for marijuana in Colorado".

43 Brett Hollenbeck and Kosuke Uetake, "Taxation and market power in the legal marijuana industry", Munich Personal RePEc Archive Paper No. 90085, 12 November 2018.

44 BDS Analytics Inc., data.

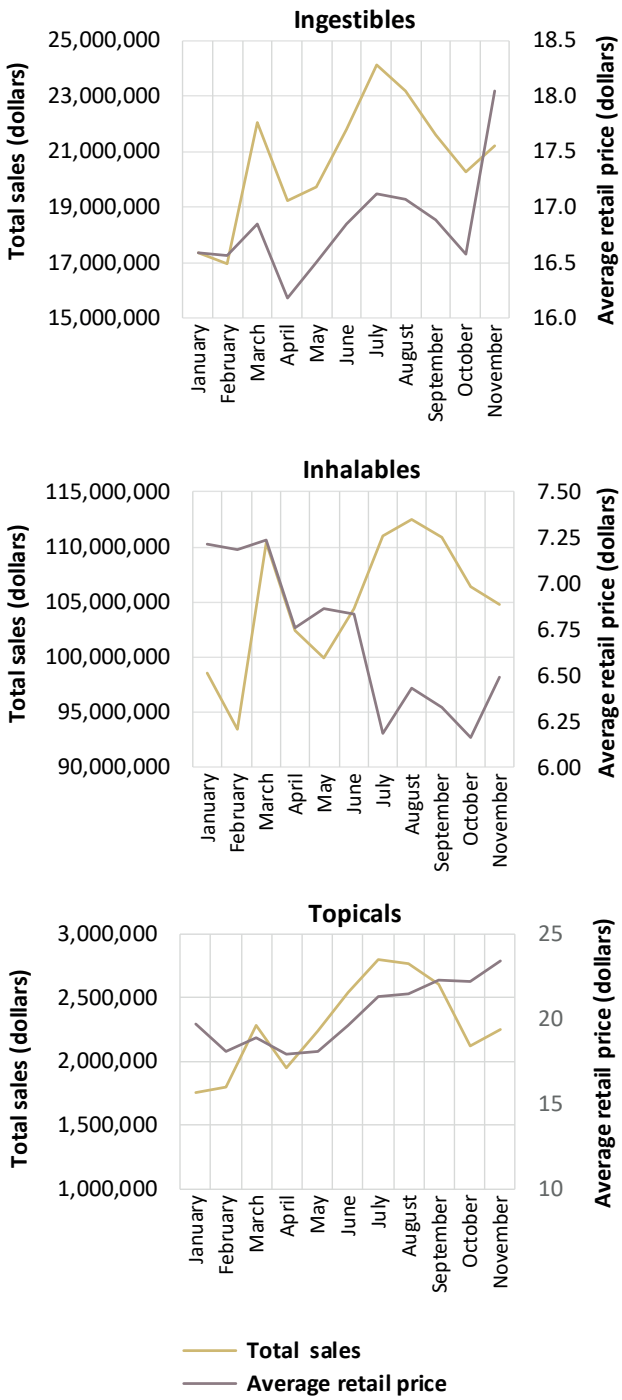
45 Orens and others, "Market size and demand for marijuana in Colorado".

use was for cannabis flower, followed by cannabis concentrates. The cannabis market appears to be moving away from flower (primarily for smoking), the price of which has been decreasing since 2014. On the other hand, an increase has been observed in the demand for products such as concentrates and edibles. In 2017, more than one third of total sales were for non-flower products, compared with one quarter in 2014. The most popular products, after cannabis flower, are oil-filled vaporizer cartridges, wax/shatter concentrates and infused edibles.

The sale of cannabis for non-medical use commenced operations in California in January 2018, albeit with some challenges

In California, the sale of cannabis for non-medical purposes officially began in January 2018, when stores were licensed. This occurred after 22 years of tolerating a largely unregulated medical cannabis market. The roll-out of sales of cannabis for non-medical purposes following the new legislation in California experienced some bottlenecks. Firstly, many cities did not allow the sale of cannabis for non-medical purposes, while many municipalities that did allow such sale were slow to issue licences to cultivators, dispensaries and manufacturers. In addition, stricter testing requirements went into effect in July 2018, before many manufacturers were ready and before adequate testing facilities were available to handle the added workload. Thus, the first year of sales was affected by supply shortages that led to high prices, a dynamic that was compounded by some of the highest tax rates on cannabis among the states that have regulations allowing its use for non-medical purposes. Cannabis prices on the regulated market in California thus remain higher than on the illicit cannabis market, in particular in the case of cannabis flower. This probably indicates that consumers of cannabis flower either remained with, or even moved to, the illicit cannabis market in 2018. As a result, the state failed to meet revenue projections in the first year. In the last months of 2018, some of the bottlenecks eased slightly and, as greater competition took hold, prices began declining slowly. However,[46] with a larger share of cannabis sales coming from categories such

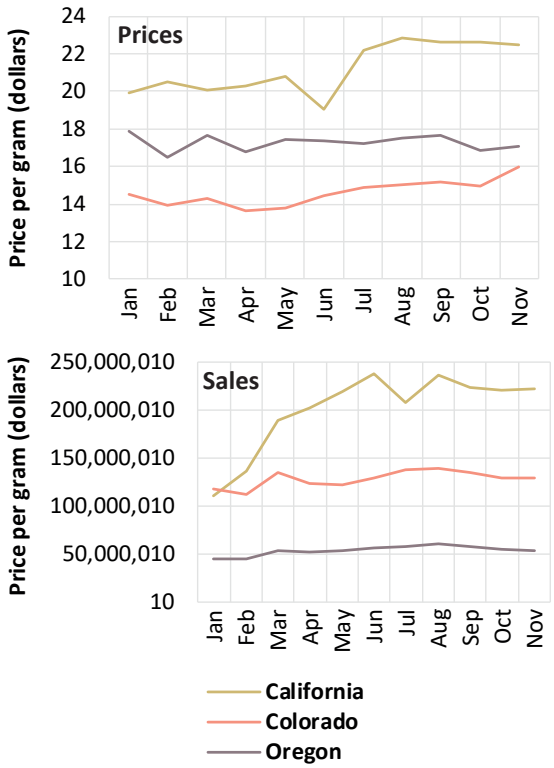
FIG. 23 Total sales and average retail price of cannabis in Colorado, by type of product, January to November 2018



Source: BDS Analytics Inc., Cannabis industry market trends and consumer insights, 2019.

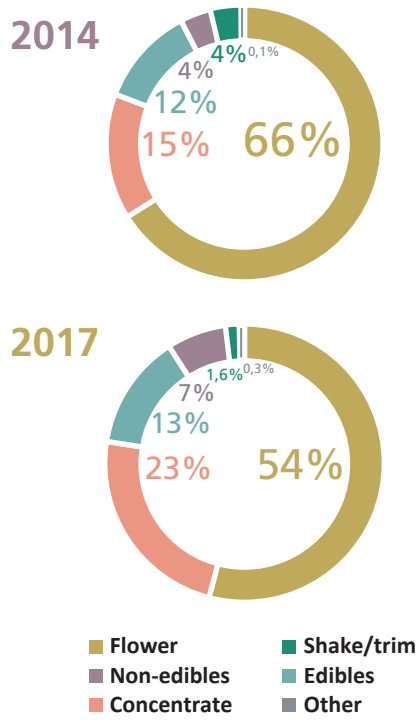
46 Analysis of market prices and sales provided by BDS Analytics Inc. to UNODC on request.

FIG. 24 Trends in cannabis prices and sales in California, Colorado and Oregon, January to November 2018



Source: BDS Analytics Inc., Cannabis industry market trends and consumer insights, 2019.

FIG. 25 Share of cannabis products in Colorado, 2014 and 2017



Source: Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Colorado, Marijuana Policy Group, August 2018).

as concentrates, edibles and topicals, with comparatively higher average retail prices, the overall average retail price of cannabis was pushed up even further.

Trend in increasing potency of cannabis products

The monitoring of the potency of cannabis products was initiated in Colorado in 2014. According to testing data, while the potency (THC levels) of cannabis flower has remained lower (19.6 per cent in 2017) than that of cannabis concentrates (68.6 per cent in 2017), the potency of both product types increased by about 20 per cent over the period 2014–2017.

The market for cannabis concentrates has evolved rapidly, with a wide range of products, such as wax, shatter, oil and vaporizer cartridges, now available, each with varying average levels of THC, although the proportion of tested cannabis concentrates that contain over 75 per cent THC has increased fivefold in recent years (from 5 per cent in 2015 to 25 per cent in 2017). As mentioned earlier, the rate of the decrease in price per serving has outpaced the price-per-gram decrease, owing to a combination of falling cannabis flower prices and a slight increase in potency from 2014 to 2017.[47]

Per-capita non-medical consumption of cannabis

Understanding how cannabis use has changed in Colorado requires analysis that goes beyond the trend in the number of users. The biggest change in the cannabis market in Colorado actually seems to have occurred in terms of heavier and more frequent use of more potent cannabis products than

47 Orens and others, "Market size and demand for marijuana in Colorado".

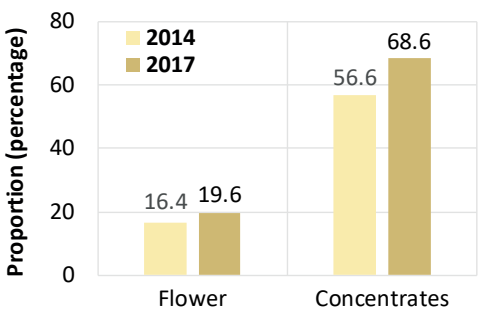
Understanding cannabis products

"Concentrates" are products made from the cannabis plant that have been processed to keep only the most sought-after plant compounds (primarily cannabinoids and terpenes), while removing excess plant material and other impurities.

"Shake" is made up of the small pieces of cannabis flower that have broken off the larger buds. "Trim" consists of the leftover leaves that are trimmed from the cannabis flower. Shake and trim offer a more cost-effective input than flower and provide reasonable levels of THC for extraction. Both shake and trim are sold directly to the consumer, usually in the form of pre-rolled joints.

"Cannabis-infused products", or "edibles", may include a range of products such as cookies, brownies and cakes, as well as cannabis-infused drinks and capsules. The ingredients may include cannabis tincture, butter or oil.

FIG. 26 THC content of cannabis flowers and concentrates in Colorado, 2014 and 2017



Source: Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Colorado, Marijuana Policy Group, August 2018).

High level of THC consumption in Colorado

Heavy cannabis consumers are estimated to consume approximately 1.6 g of flower per day. This corresponds to inhaling roughly 314 mg of THC per day, based on an average potency of 19.6 per cent THC content of cannabis flower in Colorado in 2017. The quantity of cannabis product necessary to produce 314 mg of THC varies depending on whether consumption is of cannabis flower, concentrates or infused products.

Source: Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Colorado, Marijuana Policy Group, August 2018).

in the past, whereas changes in the overall number of users are not so pronounced. An increase in current cannabis use (past 30 days) is visible across the United States as a whole. In terms of numbers, however, current users only represent a small share of annual users, although they do consume the vast majority of the cannabis products in the market.

Against the backdrop of market dynamics where cannabis prices are falling and cannabis products of up to 80 per cent THC content are increasingly available, it is important to understand the per-capita consumption of cannabis for non-medical use in Colorado.

In Colorado, based on national survey data for 2017, nearly 1 million people aged 21 or older are estimated to be past-year users of cannabis,[48] of whom one third have used cannabis once or less than once in the past month. On the other hand, more than one quarter of past-year cannabis users are estimated to be daily or near-daily users of cannabis. In 2017, it was estimated that annual consumption of cannabis flower by heavy users in Colorado was 189 tons (range: 148.3–233.4 tons), the use of most (80 per cent) of which was accounted for by daily or near-daily users of cannabis. Furthermore, it is estimated that visitors to Colorado

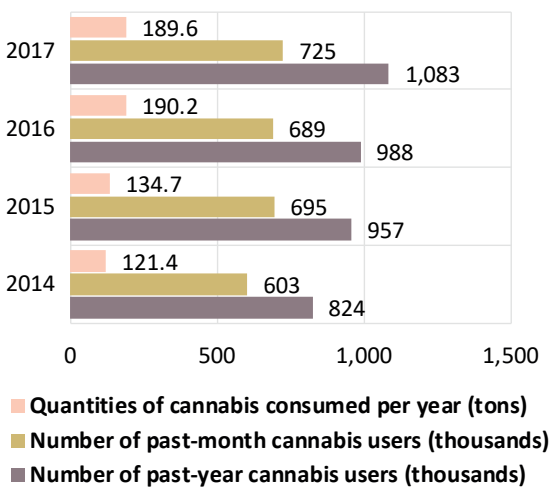
48 Marijuana Policy Group, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue, August 2018.

TABLE 1 Frequency of cannabis use in a month and annual consumption of cannabis flower among annual users of cannabis aged 21 or older in Colorado, 2017

Number of days used per month	Estimated past-year users	Proportion of users among past-year users (%)	Average consumption of cannabis flower per year (tons)	Quantity used out of total quantity (%)
Less than once	297,592	30.2	0.7	0.3
1–5 days	216,387	22	6.4	3.4
6–10 days	68,694	7	5.4	2.8
11–15 days	58,390	5.9	7.5	3.9
16–20 days	78,998	8	14	7.4
21–25 days	42,590	4.3	20.9	11
26–31 days	221,882	22.5	134.9	71.1
Total	**984,534**	**100**	**189.6**	**100**

Source: Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Colorado, Marijuana Policy Group, August 2018).

FIG. 27 Trends in the number of users aged 18 and older and estimated quantity (tons) of cannabis flower consumed in Colorado, 2014–2017



Sources: Adam Orens and others, "Market size and demand for marijuana in Colorado: 2017 market update", prepared for the Colorado Department of Revenue (Denver, Colorado, Marijuana Policy Group, August 2018).; and United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, National survey on drug use and health – state level estimates of cannabis users.

Note: The United States Substance Abuse and Mental Health Services Administration reports prevalence among those aged 12 or older or 18 years or older; in this case the latter age category has been used a proxy of number of cannabis users 21 years and older.

consume an additional 19 tons of cannabis flower per year.[49]

In terms of trends, the quantity of cannabis used by annual users saw a sharp increase over the period 2014–2017; 56 per cent in four years. While there was also an increase in the number of annual users, this was driven more by an increase in the number of past-month users and in large part by more frequent or regular users of cannabis. An increase in the state population also played a marginal role.[50] Heavy and regular use of high-potency cannabis products remains within a population subgroup that earlier studies have suggested is more socially disadvantaged than occasional cannabis users. Moreover, as the literature suggests, those cannabis users who progress to daily use have a higher probability of developing cannabis use disorders. Furthermore, high THC content in cannabis has been identified as a risk factor for acute and chronic adverse health outcomes, including mental health problems and cannabis use disorders.[51, 52]

49 Ibid.

50 Ibid.

51 Wilson M. Compton and others, "Marijuana use and use disorders in adults in the USA, 2002–14: analysis of annual cross-sectional surveys", *Lancet Psychiatry*, vol. 3, No. 10 (October 2016), pp. 954–964.

52 Steven S. Davenport and Jonathan P. Caulkins, "Evolution of the United States marijuana market in the decade of

Legalization of the non-medical use of cannabis in Canada

In 2018, the Government of Canada passed legislation permitting the production and sale of cannabis for non-medical use among people aged 18 or older. The legislation and its supporting regulations came into effect on 17 October 2018. The objectives of the legislation are to keep cannabis away from young people (under 18 years of age) while preventing criminals profiting from the distribution and sale of cannabis and safeguarding public health and safety by allowing adults (aged 18 or older) legal access to cannabis.[53] Based on the constitutional division of powers in Canada, the federal Government and provincial governments have different responsibilities.[54]

The federal Government is responsible for setting the requirements for those who grow and produce cannabis, including the types of cannabis products available for sale. Building on the framework, the production and sale of edible cannabis, cannabis extracts and topicals will be permitted for sale no later than 17 October 2019. The federal Government is also responsible for restricting promotional activity, as well as for setting standards in packaging and labelling, so that products are not appealing to young people and important product information is presented correctly. Selling cannabis through self-service displays or vending machines is also not permitted under the regulations.[55]

The provincial and territorial governments are responsible for developing, implementing, maintaining and enforcing systems to oversee the distribution and sale of cannabis. In most of them, the retail licensing regime is similar to that regulating the sale of liquor and the sale of cannabis takes place through licensed retailers, provincial retail stores and online. Provinces and territories can also add their own safety measures by adding restrictions, for example, by increasing the minimum age, set at 18 by the federal Government. At the time of writing, all the provinces and territories, other than Quebec and Alberta had set the minimum age for the non-medical use of cannabis at 19. The provinces and territories can also lower the personal possession limits, which are set at 30 g of legal cannabis, dried or equivalent, and can create additional rules for the cultivation of cannabis in the home, including the number of plants per residence. At the time of writing, most provinces allow cultivation of up to four cannabis plants either per household or, in some instances, per person. However, Manitoba and Quebec do not permit home cultivation, and the Government of Nunavut has not yet regulated the home cultivation of cannabis plants. All the provinces and territories have restrictions on the consumption of cannabis products in public places. In addition, each province and territory has its own excise stamp for cannabis products, without which their sale would not be legal.

With regard to the use of cannabis for medical purposes in Canada, access was first provided in 1999, under exemptions within the Controlled Drugs and Substance Act. In June 2013, the Government of Canada implemented the Marijuana for Medical Purposes Regulations, which set the rules and regulations of a commercial industry for the production and distribution of cannabis for medical use. Under the Regulations, individuals with a medical need could access quality-controlled dried marijuana produced under secure and sanitary conditions. In June 2015, the Government issued further exemptions to permit licensed producers to produce and sell cannabis oil, fresh cannabis buds and leaves, in addition to dried cannabis, and to allow authorized users

Permitted quantities of cannabis products for personal possession in Canada

- 30 g of dried cannabis or equivalent
- 150 g of fresh cannabis
- 450 g of edible product
- 2100 g of liquid product
- 7.50 g of concentrates (solid or liquid)
- 30 cannabis plant seeds

liberalization before full legalization", *Journal of Drug Issues*, vol. 46, No. 4 (August 2016).

53 Canada, Ministry of Justice, "Cannabis legalization and regulation". Available at www.justice.gc.ca/eng/cj-jp/cannabis.

54 See table 2 on page 36 of the present booklet.

55 Canada, Ministry of Justice, "Cannabis regulations", SOR/2018-144, December 2018.

to possess the different forms of cannabis for medical purposes. In August 2016, the Government of Canada introduced the Access to Cannabis for Medical Purposes Regulations, which replaced the earlier regulations. Health Canada is the regulatory body for cannabis for medical purposes and is responsible for licensing and overseeing the commercial medical cannabis industry and registering individuals to allow them to produce a limited amount of cannabis for their own medical purposes (or for another individual to produce it for them).

Under the new cannabis act, which came into force in October 2018, new regulations for the medical use of cannabis have replaced the Access to Cannabis for Medical Purposes Regulations.

Among other conditions, people authorized by their health-care provider are still able to access cannabis for medical purposes by buying directly from a federally licensed seller, registering with Health Canada for producing a limited amount of cannabis for their own medical purposes or designating someone to produce it for them. An authorized health-care provider can permit the use of cannabis for medical purposes for a period of up to one year and sets the daily quantity of dried cannabis expressed in grams. Furthermore, subject to age limits, in the provinces, people can also purchase cannabis (for medical use) through provincial or territorial authorized retail outlets or through authorized online sales platforms. Irrespective of how individuals obtain cannabis to be used for medical purposes, the possession limit is the lesser of a 30-day supply or 150 g of dried cannabis, or the equivalent amount if in another form. The number of people registered for the use of cannabis for medical purposes at the end of December 2018 was 359,292, which was an increase over the 23,930 people registered during the period April–June 2015.[56]

The implementation of laws permitting the non-medical use of cannabis in Canada is nascent and may take several years of monitoring to clarify how the cannabis market has evolved and to identify its dynamics and the impact of legalization on public health and public safety, among other outcome measures. Differences in the implementation of the federal legislation in the provinces may also vary in impact and thus require contextual analysis at the provincial and territorial levels. The Government of Canada has invested in a formal monitoring system and, among other measures, established a baseline in 2018 through a national cannabis survey for evaluating the impact of the new legislation and to support the development of policy and programme initiatives. The annual cannabis survey is aimed at providing an understanding of the frequency of cannabis use and to monitor changes in behaviour as a result of the legalization and regulation of the use of cannabis for non-medical purposes. The survey is also intended to be used in conjunction with other data sources to improve understanding of how the legalization and regulation of the use of cannabis could impact health and social services and the Canadian economy. The Government of Canada will also use the data to understand the patterns of use of cannabis for medical purposes and its impact on individuals. Furthermore, the Government of Canada has invested in research on cannabis and also monitors the scientific literature on the potential therapeutic uses of cannabis and its adverse effects and will continue to conduct research on cannabis and cannabinoids, including research on the use of cannabis for medical purposes.[57]

Developments in the regulation of cannabis in Uruguay

In 2013, the Government of Uruguay approved legislation (Law No. 19.172) regulating the cultivation, production, dispensing and use of cannabis for non-medical purposes. In accordance with the legislation, cannabis can be obtained by individuals aged 18 or older for non-medical purposes through registration with the national Institute for the Regulation and Control of Cannabis and by choosing one of three options: (a) purchase in authorized pharmacies; (a) membership of a club; or (c) domestic cultivation.[58] The quantity of cannabis permitted

56 Statista, "Quarterly number of medical marijuana clients registered in Canada between April 2015 and June 2018", 2019.

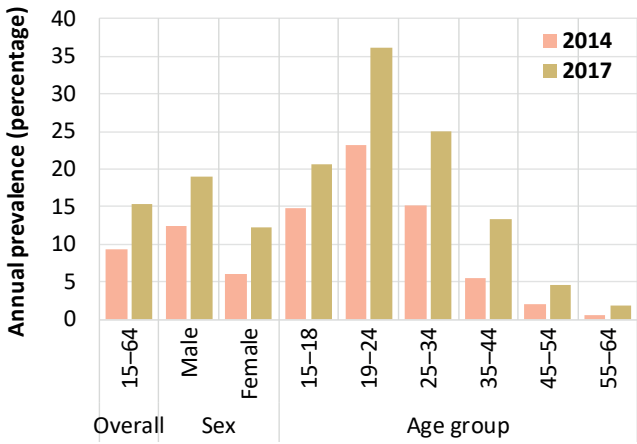
57 Canada, "Cannabis for medical purposes under the Cannabis Act: information and improvements", October 2018.

58 See also *World Drug Report 2018: Analysis of Drug Markets – Opiates, Cocaine, Cannabis, Synthetic Drugs* (United Nations publication, Sales No. E.18.XI.9 (Booklet 3)).

per person, obtained through any of the three mechanisms, cannot exceed 480 g per year. Initially, the Government of Uruguay set THC content at 2 per cent and CBD content at 6–7 per cent. In 2017, the Government introduced two new varieties, with THC content of 9 per cent and CBD content of almost 3 per cent.[59] Overall, the implementation of the regulation has been slow and gradual; for example, by February 2018 there were 16 pharmacies dispensing cannabis for non-medical use in the country, with 34,696 people registered to acquire cannabis from them. By February 2019, 115 cannabis clubs had been registered, with a total membership of 3,406, and 6,965 persons had been registered for personal or domestic cultivation of cannabis. This makes a total of approximately 45,000 people with access to the regulated cannabis market in Uruguay,[60] which remains a small share of the entire population of cannabis users in the country.

A survey on drug use was implemented by the Uruguayan Drug Observatory in 2014. The results of that survey showed an estimated annual prevalence of cannabis use of 9.3 per cent (12.5 per cent among men and 6.4 per cent among women), or about 162,000 past-year cannabis users. The past-month prevalence of cannabis use in 2014 was 6.5 per cent (9.4 per cent among men and 3.8 per cent among women), or about 112,000 past-month cannabis users.[61] In 2017, the project Monitor Cannabis Uruguay implemented another drug use survey, which showed that annual prevalence of cannabis use was 15 per cent among the adult population aged 15–64.[62] While past-year cannabis use increased over the period 2014–2017, among both men and women, the main increase was observed among young people (aged 19–24) and, to a lesser extent, among young adults (25–34 years).

FIG. 28 Cannabis use in Uruguay, by sex and age group, 2014 and 2017



Source: Monitor Cannabis Uruguay, 2018.

59 John Hudak, Geoff Ramsey and John Walsh, "Uruguay's cannabis law: pioneering a new paradigm", (Washington D.C., Centre for Effective Public Management, Brookings Institution, March 2018).

60 Uruguay, IRCCA, 4 March 2019.

61 Uruguay, Sixth national household survey on drug use (National Drug Observatory and National Drug Council, 2016).

62 Clara Musto and Gustavo Robaina, "Evolución del consumo de cannabis en Uruguay y mercados regulados", Monitor Cannabis Uruguay, 2018.

TABLE 2 Regulations for the legalization of the non-medical use of cannabis in Canada

	Federal law	Alberta	British Columbia	Manitoba
Legal process	Government legalislation			
Title	Cannabis Act	Gaming, Liquor and Cannabis Act and Gaming, Liquor and Cannabis regulation	Cannabis control and licensing Act (CCLA) Cannabis distribution Act (CDA)	Safe and Responsible Retailing of Cannabis Act
Date implemented	October 17, 2018			
Regulatory authority		Albertal Gaming Liquor and Cannabis (AGLC)	Liquor and cannabis regulation branch	Liquor, Gaming and Cannabis Authority of Manitoba (LGCA) Manitoba Liquor and Lotteries (MBLL)
Minimum age	18	19	19	19
Personal possession quantity	30 g dried or equivalent i.e., 150 g of fresh cannabis 450 g of edible product 2100 g of liquid product 7.5 g of concentrates (solid or liquid) 30 cannabis plant seeds	30 g or equivalent	30 g or equivalent	30 g or equivalent
Home cultivation	Grow from licensed seeds four cannabis plants per residence for personsal use Cannabis products such as food and drink at home if organic solvents are not used	Yes	Adults can grow up to four cannabis plants per household, but the plants must not be visible from public spaces.	Home growing is not permitted
Interpersonal sharing	30 g or equivalent of legal cannaibs product			
Retail transaction limit		30 g or equivalent		
Average retail price per gram after tax		$9.24 per gram	Dried cannabis flowers at $6.99 to $16.28 per gram.	$12 per gram

	Federal law	Alberta	British Columbia	Manitoba
Maximum THC content	Dried cannabis to be consumed by inhalations must not exceed 1 g in each discrete unit of cannabis product Products intended to be "administered orally, rectally, vaginally or topically" must not exceed a maximum yield quantity of 10 mg of THC. Cannabis oil must not exceed a maximum yield of 30 mg of THC per ml of the oil			
Commercial production	Licensed producers. Each province has an Excise stamp that needs to be fixed on the cannabis products			
Commercial distribution		Licensed retailers Private retail stores, provincial online sales	Private and provincial retail stores, online sales Retail licensing regime similar as for liquor	Private retail stores and online sales
Restrictions on edibles	Cannabis edible products and concentrates will be legal for sale one year after, i.e., October 2019	Edicles as yet not allowed	Edibles to be allowed within a year	Not allowed until Federal Government allows
Advertising	No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly.	No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly Advertising allowed inside cannabis stores	Same as Federal Law	
Taxation Cannabis excise duty rates in provinces and territories (Department of Finance, Canada)	Flower $0.25/g Trim $0.75/g Seed $0.25/seed Seedling $0.25/seedling Federal Ad Valorem Rate 2.5% of dutibal amount of cannabis product when delivered to purchaser	Flower: $ 0.75/g plus 16.8% of base amount Trim: $0.225/g plus 17.8% of base amount Seed: $0.75/seed plus 16.8% of base amount Ad Valorem Additional Rate 7.5% plus 16.8% of deductible amount when delivered (total applicable rate 24.3%)	Flower $0.75/g Trim $0.22/g Seed and seedling : $0.75/seed or seedling 7.5% provincial sale tax in addition to Federal taxes	Wholesale mark-up on non-medical cannabis, a $0.75 per gram mark-up plus 9% per cent mark-up applied on top of the $0.75 per gram
Restrictions on use		In cars, areas frequented by children, or tobacco-restricted areas	In cars, arease frequented by children, or tobacco restricted areas	Smoking and vaping cannabis is illegal in public places (including enclosed public places)

	Federal law	New Brunswick	New Foundland and Labrador	Northwest Territories
Legal process	Government legalislation			
Title	Cannabis Act	Cannabis Control Act Cannabis Management Corporation Act	Newfoundland and Labrador Cannabis Regulations Control and Sale of Cannabis Act	Cannabis Legalization and Regulation Implementation Act
Date implemented	October 17, 2018			
Regulatory authority		Cannabis Management Corporation	Newfoundland and Labrador Liquor Corporation (NLC)	North West Territories Liquor & Cannabis Commission (NTLCC)
Minimum age	18	19	19	19
Personal possession quantity	30 g dried or equivalent i.e., 150 g of fresh cannabis 450 g of edible product 2100 g of liquid product 7.5 g of concentrates (solid or liquid) 30 cannabis plant seeds	30 g or equivalent	30 g or equivalent	30 g or equivalent
Home cultivation	Grow from licensed seeds four cannabis plants per residence for personsal use Cannabis products such as food and drink at home if organic solvents are not used	Can grow up to four plants at primary residence. Plants must be kept in a separate locked space Outdoor plants must be located behind a locked enclosure at least 1.52 metres high	A private dwelling can contain up to four cannabis plants	Grow up to four cannabis plants per household
Interpersonal sharing	30 g or equivalent of legal cannaibs product			
Retail transaction limit				
Average retail price per gram after tax		$8.50 to 15.50	Range $16-13 per gram	Government online store $13.13 to $17.50 per gram

	Federal law	New Brunswick	New Foundland and Labrador	Northwest Territories
Maximum THC content	Dried cannabis to be consumed by inhalations must not exceed 1 g in each discrete unit of cannabis product Products intended to be " administered orally, rectally, vaginally or topically" must not exceed a maximum yield quantity of 10 mg of THC. Cannabis oil must not exceed a maximum yield of 30 mg of THC per ml of the oil			
Commercial production	Licensed producers. Each province has an Excise stamp that needs to be fixed on the cannabis products			
Commercial distribution		Cannabis NB retail stores and online sales	Private retail stores, provincial online sales	NWT Liquor Stores, provincial online sales
Restrictions on edibles	Cannabis edible products and concentrates will be legal for sale one year after, i.e., October 2019			
Advertising	No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly.			
Taxation Cannabis excise duty rates in provinces and territories (Department of Finance, Canada)	Flower $0.25/g Trim $0.75/g Seed $0.25/seed Seedling $0.25/seedling Federal Ad Valorem Rate 2.5% of dutibal amount of cannabis product when delivered to purchaser	Flower: $0.75/g Trim:$0.225/g Seed/seedlings $0.75 7.5% of the dutiable amount when delivered to purshaser	Flower: $0.75 /gm Trim:$0.225 /gm Seed/seedlings $0.75 7.5% of the dutiable amount when delivered to purshaser	Flower: $0.75/g Trim:$0.225/g Seed/seedlings $0.75 7.5% of the dutiable amount when delivered to purshaser
Restrictions on use		Illegal to smoke everywhere except private property or residence	Illegal to smoke everywhere except private property or residence	Illegal to smoke everywhere except private property or residendce

	Federal law	Nova Scotia	Nunavut	Ontario
Legal process	Government legalislation			
Title	Cannabis Act	Cannabis Control Act	Cannabis Act Cannabis Statutes Amendments Act	Cannabis, Smoke-Free Ontario, and Road Safety Statute Law Amendment Act, 2017 Cannabis Statute Law Amendment Act, 2018
Date implemented	October 17, 2018			
Regulatory authority		Nova Scotia Liquor Corporation	Nunavut Liquor and Cannabis Commission	Alcohol and Gaming Commission of Ontario
Minimum age	18	19	19	19
Personal possession quantity	30 g dried or equivalent i.e., 150 g of fresh cannabis 450 g of edible product 2100 grams of liquid product 7.5 grams of concentrates (solid or liquid) 30 cannabis plant seeds	30 g or equivalent No limit on home storage for personal use	30 g or equivalent	30 g or equivalent
Home cultivation	Grow from licensed seeds four cannabis plants per residence for personsal use Cannabis products such as food and drink at home if organic solvents are not used	Adults can grow up to four cannabis plants per household	Territorial government can regulate whether plants can be grown at home	Adults can grow up to four plants per residence
Interpersonal sharing	30 g or equivalent of legal cannaibs product			
Retail transaction limit				
Average retail price per gram after tax		$6.33 to $10.99 for "value cannabis," $9.00 to $10.98 for "core cannabis," and $10.99 and above for "premium cannabis."	$13.71 per gram	$7.95 to $13.25 per gram

	Federal law	Nova Scotia	Nunavut	Ontario
Maximum THC content	Dried cannabis to be consumed by inhalations must not exceed 1 g in each discrete unit of cannabis product Products intended to be "administered orally, rectally, vaginally or topically" must not exceed a maximum yield quantity of 10 milligrams of THC. Cannabis oil must not exceed a maximum yield of 30 mg of THC per ml of the oil			
Commercial production	Licensed producers. Each province has an Excise stamp that needs to be fixed on the cannabis products			
Commercial distribution		Designated NSLC stores or online	Currently through government-operated online store or by phone	Government retail stores and online sales
Restrictions on edibles	Cannabis edible products and concentrates will be legal for sale one year after, i.e., October 2019	Sale of edibles illegal under Federal law Edibles can be produced at home for personal use		
Advertising	No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly			
Taxation Cannabis excise durty rates in provinces and territories (Department of Finance, Canada)	Flower $0.25/g Trim $0.75/g Seed $0.25/seed Seedling $0.25/seedling Federal Ad Valorem Rate 2.5% of dutibal amount of cannabis product when delivered to purchase	Flower: $0.75/m Trim: $0.225/m Seed/seedlings $0.75 7.5 % of the dutiable amount when delivered to purshaser	Flower: $0.75/g plus 19.3% of base amount Trim: $0.225/g plus 19.3% of base amount Seed/seedling: $0.75 seed plus 19.3% of base amount 7.5% plus plus 19.3% of the dutiable amount of a cannabis product when delivered to a purchaser (total applica-ble rate of 26.8%)	Flower: $0.75/g plus 3.9% of base amount Trim: $0.225/g plus 19.3% of base amount Seed/seedling: $0.75 seed plus 19.3% of base amount 7.5% plus plus 19.3 % of the dutiable amount of a cannabis product when delivered to a purchaser (total applicable rate of 26.8 %)
Restrictions on use		Illegal everywhere except for areas where tobacco may be smoked	Illegal everywhere except for areas where tobacco may be smoked	Illegal to smoke everywhere except private property

	Federal law	Prince Edward Island	Quebec	Saskatchewan	Yukon
Legal process	Government legalislation				
Title	Cannabis Act	Cannabis Control Act Cannabis Management Corporation Act	Cannabis Regulation Act Act to constitute the Société québécoise du cannabis	The cannabis control (Saskatchewan) Act The cannabis control (Saskatchewan) regulations	Cannabis control and regulation act
Date implemented	October 17, 2018				
Regulatory authority		Provincial cannabis committee Cannabis management corporation	Société québécoise du cannabis	Cannabis Authority under the Saskatchewan Liquor and Gaming Authority	Yukon Liquor Corportation Cannabis Licensing Board (2019)
Minimum age	18	19	18	19	19
Personal possession quantity	30 g dried or equivalent i.e., 150 g of fresh cannabis 450 g of edible product 2100 grams of liquid product 7.5 grams of concentrates (solid or liquid) 30 cannabis plant seeds	30 g or equivalent	30 g in a public place 150 g in a private residence	30 g of dried cannabis or equivalent	30 g of dried cannabis or equivalent
Home cultivation	Grow from licensed seeds four cannabis plants per residence for personal use Cannabis products such as food and drink at home if organic solvents are not used	A household is permitted to have four cannabis plants.	Prohibited to cultivate cannabis for personal use	Limit of four cannabis plants grown per household	Four plants per household
Interpersonal sharing	30 g or equivalent of legal cannaibs product				
Retail transaction limit			30 g per visit at Société québécoise du cannabis		30 g per purchase
Average retail price per gram after tax		$5.65 pre-rolled half gram $7.83 per gram	$8.5 per gram	$13 to $16 per gram	$10.09 per gram THC oil $68.28 per bottle
Maximum THC content	Dried cannabis to be consumed by inhalations must not exceed 1 g in each discrete unit of cannabis product Products intended to be "administered orally, rectally, vaginally or topically" must not exceed a maximum yield quantity of 10 milligrams of THC. Cannabis oil must not exceed a maximum yield of 30 mg of THC per ml of the oil				

	Federal law	Prince Edward Island	Quebec	Saskatchewan	Yukon
Commercial production	Licensed producers. Each province has an Excise stamp that needs to be fixed on the cannabis products		Licensed producers		
Commercial distribution		Four dedicated government-owned retail stores and online sales	Government retail stores and online sales	Private retail stores, provincial online sales	Government retail stores and online sales Cannabis Yukon retail store
Restrictions on edibles	Cannabis edible products and concentrates will be legal for sale one year after, i.e., October 2019				
Advertising	No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly				
Taxation Cannabis excise durty rates in provinces and territories (Department of Finance, Canada)	Flower $0.25/g Trim $0.75/g Seed $0.25/seed Seedling $0.25/seedling Federal Ad Valorem Rate 2.5% of dutibal amount of cannabis product when delivered to purchase	Flower: $0.75/g Trim:$0.225/g Seed/seedlings $0.75 7.5 % of the dutiable amount when delivered to purshaser	Flower: $0.75/g Trim:$0.225/g Seed/seedlings $0.75 7.5 % of the dutiable amount when delivered to purshaser	Flower: $0.75/g plus 6.45% of base amount Trim: $0.225/g plus 6.45% of base amount Seed/seedling: $0.75 seed plus 6.45% of base amount 7.5% plus plus 6.45 per cent of the dutiable amount of a cannabis product when delivered to a purchaser (total applicable rate of 13.95%)	Flower: $0.75/g Trim: $0.225/g Seed/seedlings $0.75 7.5% of the dutiable amount when delivered to purshaser
Restrictions on use		Illegal to smoke everywhere except private property, some exceptions for certain public spaces	Illegal to smoke everywhere except for areas where tobacco may be smoked, excluding university and CEGEP campuses	Illegal to smoke everywhere except private property or residendce	Illegal to smoke everywhere except private property or residendce

TABLE 3 Regulations for the legalization of the non-medical use of cannabis in jurisdictions in the United States

	Alaska	California	Colorado	District of Columbia	Maine
Legal process	Voter initiative, state statute	Voter initiative	Voter initiative, amendment to state constitution	Voter initiative	Voter initiative
Title	Ballot Measure 2	Proposition 64	Amendment 64	Initiative 71	Question 1
Date passed	Nov-14	Nov-16	Nov-12	Nov-14	Nov-16
Date implemented/required date of rule adoption	February 2015: Personal possession, consumption, cultivation October 2016: Retail sales	Licences to be issued by 11 January 2018	December 2012: Personal possession, consumption, cultivation January 2014: Retail sales	February 2015: Personal possession, consumption, cultivation	Take effect on 7 January 2017; regulation for business to be in place August 2017
Regulatory authority	Alcohol and Marijuana Control Office	Bureau of Marijuana Control	Marijuana Enforcement Division (Department of Revenue)	Not applicable; considering separate legislation to regulate commercial production and sale to adults	Department of Agriculture, Conservation and Forestry
Minimum age	21	21	21	21	21
Residency requirement	None	Not specified	None	None	Not specified
Personal possession quantity	28.5 g	1 oz flower 8 g concentrate	28.5 g	2 oz (57 g)	2.5 oz (70.8 g) 5g concentrate
Home cultivation	Six plants, three of which can be flowering; not subject to public views; within property with lawful possession or with consent of the person in lawful possession	Six plants, away from view	Six plants, three of which can be flowering	Six plants per person; Twelve plants per household, six of which can be flowering	Six mature plants, twelve immature plants, unlimited amount of seedlings away from view and tagged with personal identification number. Property owners can prohibit home cultivation. Cultivation for medical purposes not subject to same restrictions
Interpersonal sharing	28.5 g	Yes	28.5 g	28.5 gm or less	Yes for home grow. Not permitted for retail marijuana
Retail transaction limit	28.5 g	Presumably same limits for personal possession	Residents: 28.5 g Non-residents: 7 g	Not applicable	2.5 oz. of marijuana Twelve seedlings
Retail pricing structure	Market	Market/commercial	Market	Market	Market/commercial
Average retail price per gram after tax	Medium $20.00	$21.20	$14.60	Not applicable	Medium quality $14.00
Maximum THC content	Not set initially	Not set initially	Not set initially	Not set initially	Not set initially
Registration requirements	None	Not specified	None	None	Not specified

	Alaska	California	Colorado	District of Columbia	Maine
Commercial production	Licensed cannabis producers	Licensed cultivators and manufacturers, varying types	Licensed cannabis cultivation facilities	None	Licensed cultivators; two types based on size
Commercial distribution	Licensed retail cannabis stores	Limits on market concentration	Licensed retail cannabis stores	None	State authority may not limit total number of stores; localities may regulate number and location of establishments
Restrictions on edibles	5 mg of THC for single serving, no more than 50 mg of homogenous THC allowed per package. Child-resistant packaging required. Separate warnings on risks, not appealing to children	10 mg THC per serving. Warning and potency labels. List of ingredients and cannabinoid content	Maximum of 10 mg of THC in each individually packed serving; warning labels "keep out of reach of children"; THC symbol on labels and not attractive to children	Currently not allowed	Serving size and potency limits to be developed in regulations. List of ingredients packing and labels; products and edibles may not contain additives designed to make product more appealing to children
Advertising	Logo or advertisement for licensed marijuana may not promote excessive consumption, depiction appealing to a person under 21 years. Restrictions on advertisements in school areas, public transport, and contrain presribed warning	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children	Restricted to media with no more than 30% of the audience under the age of 21	Not applicable, no commercial market	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children
Taxation	$50 excise tax per ounce on sales or transfers from cultivation facility to retail store or product manufacturer; other parts of plant, e.g., stems and leaves are taxed at $15 per ounce	15% excise on retail, $9.25 per dry weight ounce on flower after harvest. $2.75 per drug weight ounces on leaves	15% excise tax on cultivation; 10% retail marijuana sales tax to be decreased to 8% in July 2017 2.9% state sales tax Up to 3.5% local sales taxes	Not applicable, no commercial market	10% excise on retail
Cannabis clubs	Not explicitly allowed or prohibited Earlier ban on in-store consumption repealed in November 2015	Not specified although they may exists in the form of microbusiness that allow on-site consumption	Not allowed	Not allowed; currently under investigation by city task force.	State-licensed clubs
Restrictions on use	Cannabis use in public is unlawful	Prohibit cannabis use in a public place unlicensed for such use, including near schools and other areas where children are present.	Not permitted in public places	Not permitted in public places (use on private property)	Not permitted in public places (allowed use in private property or smoking in a state-licensed marijuana social club)
Medical cannabis	1998: Patient registry, no dispensaries registration; out-of-state patients recognized for approved conditions but not for dispensary purchases; possession, home cultivation	1996 and 2003; Patient registry - voluntary registration; cooperatives and collectives; State-wide licensing of dispensaries will begin 2018	2000: Patient registry, dispensaries already existed; out-of-state patients not recognized; possession, consumption; 2010: commercial production and sales	1998/2010: Patient registry; dispensaries allowed	1999: Patient registry or identification card; dispensaries, recognizes patients from other states but not for dispensary purchases

TABLE 4 Regulations for the legalization of the non-medical use of cannabis in jurisdictions in the United States and Uruguay

	Michigan	Massachusetts	Nevada	Oregon	Vermont	Washington	Uruguay
Legal process	Voter initiative	Voter initiative	Voter initiative	Voter initiative, state statute	Legislative process	Voter initiative, state statute	Government initiative, national law
Title	Proposal 18-1	Question 4	Question 2	Measure 91	No. 86	Initiative 502	Law No. 19.172
Date passed	6 December 2018	Nov-16	Nov-16	Nov-14		Nov-12	Dec-13
Date implemented/ required date of rule adoption	Commercial licences application begin by 6 December, 2019	15 September 2017. Licences issued starting 1 October 2017	Takes effect on 1 January 2017 and regulations to in place by 1 January 2018	July 2015: Personal possession, consumption, cultivation October 2015 up to December 2016: Retail sales through medical dispensaries January 2017: retail sales through licensed retailers	01 July 2018	December 2012: Personal possession, consumption July 2014: Retail sales	August 2014: Personal cultivation October 2014: Grower clubs Mid-2017: pharmacy sales
Regulatory authority	Department of Licensing and Regulatory Affairs	1) Cannabis Control Commission, and 2) Cannabis Advisory Board	Department of Taxation	Oregon Liquor Control Commission		Liquor and Cannabis Board (formerly the Liquor Control Board)	Institute for the Regulation and Control of Cannabis (IRCCA)
Minimum age	21	21	21	21	21	21	18
Residency requirement		Not specified	Not specified	None		None	Uruguayan citizenship or permanent Uruguayan residency required
Personal possession quantity	2.5 oz (70.8 g) on person and 10 oz (283 g)at home	1 oz flower (28.5 g)	1 oz flower	In public: 28.5 g	1 oz or 5 g of hashish	28.5 g	40 g per month
		5g concentrate	3.5g concentrate	At home: 228 g			
Home cultivation	Up to 12 plants per household	6 plants, 12 in a single residence away from view; 10 oz. of dried marijuana permitted at home	Six plants, no more than twelve on property in indoor or in enclosed with permission of landlord and must be 25 miles away from retail cannabis store	Four plants in flower	2 mature plants or 4 immature plants	Not allowed	Six plants in flower

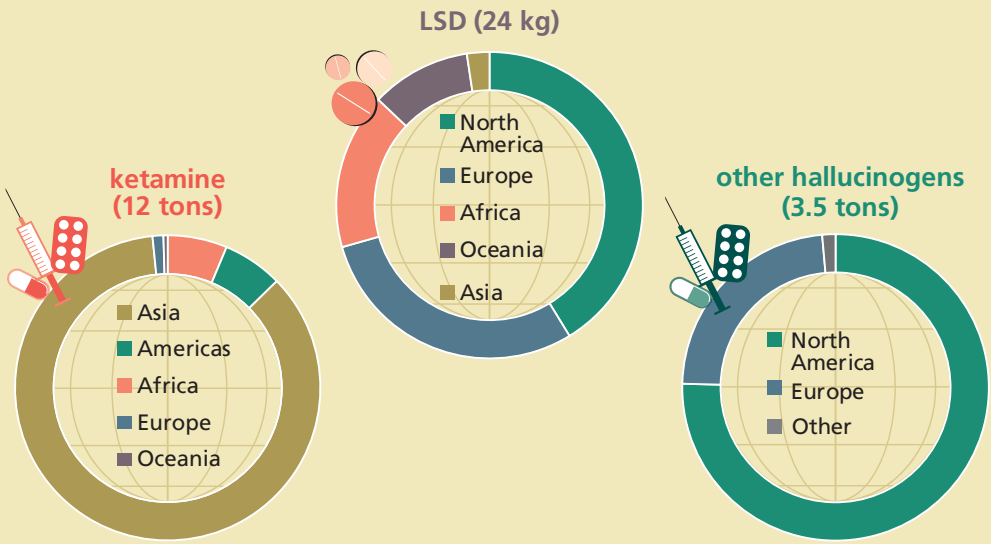
	Michigan	Massachusetts	Nevada	Oregon	Vermont	Washington	Uruguay
Interpersonal sharing	Yes (2.5 oz with a max of 15 mg of concentrate)	Yes	Yes	28.5 g	Same as personal possession limits	Not allowed	Allowed within the home
Retail transaction limit		Not specified, presumably same limits as for personal possession	Not specified, presumably same limits as for personal possession	1 oz dried flower 16 oz edbile form 72 oz cannabis in liquid form 10 cannabis seeds 4 immature cannabis plants		28.5 g	40 g per month, 10 g per week (sale through pharmacies to registered users)
Retail pricing structure	Market/commercial	Market/commercial	Market/commercial	Market	No provision for setting up a taxed-and-regulated retail marketplace	Market	Government price control
Average retail price per gram after tax		Medium quality $12.9	Medium quality $10.05	$17.26		Medium quality $11.15	200 pesos per 5 grams (apprx US $1.4 per gram)
Maximum THC content		Not set initially	Not set initially	Not set initially	Not set	Not set initially	All products are required to indicate that CBD is equal to or more than 3 per cent and THC is equal to or less than 9%.
Registration requirements		Personal data collection not required	Personal data collection not required	None		None	Yes, with IRCCA for any of the three modes of access
Commercial production	Licensed establishments	Licensed establishments	Licensed establishment	Licensed cannabis producers	Not clarified in law	Licensed cannabis producers	Licensed marijuana producers
Commercial distribution	A municipality may completely prohibit or limit the number of establishments operating	Licensed establishments; localities can regulate, limit or prohibit the operation of businesses	Limits on market concentration by population	Licensed retail cannabis stores	Not clarified in law	Marijuana can only be sold and purchased at state-licensed retail stores	Licensed pharmacies

	Michigan	Massachusetts	Nevada	Oregon	Vermont	Washington	Uruguay
Restrictions on edibles		Serving size and potency limits to be developed in regulations. List of ingredients	Not specified	Maximum of 10 mg of THC in each individually packed serving; edible products to undergo a preapproval process; not appealing to children		10 mg of THC in each individually packaged serving; child-proof packaging; THC labelling; marijuana-infused products, packages and labels to be approved by the State Liquor Control Board before sale	
Advertising	Restrictions on public signs related to cannabis establishments	Restrictions on marketing to children to be developed in regulations	A licensed marijuana establishment cannot engage in advertising that contains any false or misleading statements, promotes overconsumption, depicts actual consumption, or appeals to minors. Also applies 70/30 rule from Colorado	Entry sign required on exterior of dispensaries; Oregon Liquor Control Commission has authority to further regulate or prohibit advertising		Cannabis business licensees are limited to two permanent signs on their licensed premises, and all other forms of outdoor ads on the premises are banned. New rules mandated that billboards and signs can no longer contain images of the cannabis plant or cannabis products. Cannot contain depictions of cartoon characters or any depictions that may be appealing to children	Prohibited
Taxation	10% excise tax	3.75% excise on retail	15% excise on wholesale sale 10% excise tax on retail sale	No tax on retail sales from October 2015 to December 2015 25% sales tax after 5 January 2016 17% sales tax in 2017 with options for local communities to establish local tax up to 3%		July 2014 to June 2014: 25% at each stage (production, processing, retail) July 2015: 37% sales tax	No tax, although IRCCA can impose tax in the future.

	Michigan	Massachusetts	Nevada	Oregon	Vermont	Washington	Uruguay
Cannabis clubs		Not allowed, although they may exist in establishments that allow on-site-consumption	Not specified	Not allowed		Not allowed	Clubs with 15-45 members allowed to cultivate up to 99 plants, maximum 480 g of dried product per member per year
Restrictions on use	Not permitted in places place or where prohibited by owner or designatted public places not accessible to persons under 21 years of age	Cannot use cannabis in a place where smoking tobacco is prohibited	Cannabis consumption is for private use only. It is illegal to smoke in public, on federal land or in a vehicle without risking a fine.	Smoking marijuana in public is illegal,	Use is limited to individual dwellings. Prohibited in street, alley, park or sidewalk in addition to usual smoke free places	It is illegal to consume marijuana in view of the public	
Medical cannabis	2008: patient registry, dispensaries can be established with local ordinances; dispensation for specific conditions, recognize out of state patinets only for legal protection of possession but not for dispensary purchases	2012/2013; patient registry or identification cards; dispensaries, out-of-state patients not recognized	2000: Patient registry or identification card, No dispensaries; recognize out of state patients if other state's programmes are substantially similar; patients must fill out Nevada paper work	1998: Patient registry, dispensaries already existed but not clearly authorized by law or regulated; possession, home cultivation		1999/2010/2011; no registration or identification card; dispensaries approved as of November 2012, first stores opened in July 2014: 1999 possession 2012: Home cultivation	2014: Passed, but not yet effective

HALLUCINOGENS

2017 Quantity of hallucinogens seized by region



Introduction

Hallucinogens are a diverse group of naturally occurring and synthetic drugs that induce distorted states of consciousness, perception, thinking and feeling, accompanied by different degrees of auditory or visual hallucinations.[63] The status of control for different hallucinogens varies: most of the common hallucinogens are controlled under the Convention on Psychotropic Substances of 1971, although some synthetic hallucinogens are not currently under international control and are labelled as NPS. Ketamine is an example of non-controlled substance that is included in the WHO list of essential medicines.[64] For the hallucinogens that are under international control, the 1971 Convention does not cover the plants or plant material from which these substances can be extracted. As an example, psilocybin is under international control but the mushroom *Psilocybe mexicana*, from which it is extracted, is not. Nevertheless, under the national legislation of many countries, both the psychoactive substance and the plant material from which the substances are extracted are controlled.

Many NPS with hallucinogenic effects are reported to UNODC and remain in circulation in different markets. As is the case with all NPS, many substances with a hallucinogenic, dissociative or anaesthetic effect are transient and thus may appear and disappear quickly from the market. Among them, substances belonging to the NBOMe series, which are either sold or referred to as LSD, "synthetic LSD" or "ecstasy" have been reported by many countries, in particular, in South America.[65]

On the basis of their mechanism of action in the human central nervous system, hallucinogens in general can be divided into two main groups: classic hallucinogens and dissociative or anaesthetic

63 *Terminology and Information on Drugs*, 3rd ed. (United Nations publication, E.16.XI.8).

64 Although ketamine is not a new substance, in some instances it is included under the category of NPS in order to differentiate it from controlled substances.

65 *World Drug Report 2017*.

TABLE 5 International control status of some common hallucinogens

Controlled hallucinogens	Schedule of the Convention on Psychotropic Substances of 1971
PCP	II
LSD	I
Psilocybin	I
Mescaline	I
Tryptamines Diethyltryptamine (DET) Dimethyltryptamine (DMT) Etryptamine	I
Mescaline	I
25B-NBOMe 25C-NBOMe 25I-NBOMe	II
4-Bromo-2,5-dimethoxyphenethylamine (2C-B)	II
Brolamfetamine (DOB)	I
2,5-Dimethoxy-4-methylamphetamine (STP/DOM)	I
3,4,5-Trimethoxyamphetamine (TMA)	I
Non-controlled hallucinogens	
Ketamine	WHO list of essential medicines
Plants, such as *Salvia divinorum*, containing Salvinorin A	
Peyote cactus (mescaline)	
Numerous species of mushrooms from the genera C*onocybe, Copelandi, Panaeoulus, Psilocybe* and *Strophia*, which are also commonly called "magic mushrooms" and produce the main ingredient psilocybin and related compounds	

Source: 1971 Convention on Psychotropic Substances.

hallucinogens.[66] Classic hallucinogens fall into several chemically related groups, such as LSD, mescaline, psilocybin, bufotenine, DMT and 5-MeO-DMT (5-methoxy-dimethyltrptamine) and salvinorin. Classic hallucinogens, such as LSD, psilocybin or DMT, are also referred to as "psychedelics". By acting as serotonin receptor agonists, those substances ultimately produce synaesthesia and altered perceptions of reality. Synaesthesia is an extraordinary condition in which senses that are usually experienced separately are combined, so that a person hearing a sound may see a colour as a result (a phenomenon referred to as "hearing colours").[67]

Mescaline is a hallucinogen found in several species of cactus, such as the peyote. The mechanism of action of mescaline is similar to other hallucinogens and its effects are mediated through its interaction with serotonin receptors in the body. The effects of mescaline can last up to 10–12 hours. Psilocybin is another naturally occurring hallucinogen found in numerous species of mushroom that are often referred to as "magic mushrooms"; the duration of action of psilocybin is typically 4–6 hours.[68] *Salvia divinorum* is another plant-based hallucinogen with the principal psychoactive substance salvinorin A. The substance may produce out-of-body experiences and other feelings resembling, but not necessarily identical to, those produced by other hallucinogens.[69]

LSD is a semi-synthetic drug that is derived from lysergic acid – an alkaloid found in a fungus. LSD is one of the most potent hallucinogenic substances scheduled under the drug conventions. As with other hallucinogens, the effects of LSD vary and depend

66 Ibid.

67 *Terminology and Information on Drugs.*

68 Ibid.

69 Meyer and Quenzer, *Psychopharmacology: Drugs, the Brain, and Behaviour.*

on the mental state of the user and the setting. For some individuals, the same dose may produce good and bad experiences ("trips"), depending on the circumstances of use. Long-term effects of LSD use can include frightening flashbacks, also called Hallucinogen Persisting Perception Disorder, ongoing visual disturbances, disorganized thinking, paranoia and mood swings.[70]

Tryptamines (e.g., DMT) are a group of substances that are related to LSD and psilocybin in their structure and action. In addition, several tryptamines also occur naturally in a variety of plants, fungi and animals. Some tryptamines can also be manufactured through chemical synthesis, and many of the DMT analogues, such as alpha-methyltryptamine (AMT) and 5-methoxy-diisopropyltryptamine, have become popular in recent times. Currently, no tryptamines are approved for medical use. When DMT is smoked or snorted it can produce a brief – lasting up to 30 minutes – but intense hallucinatory experience.[71, 72]

The NBOMe series are another group of synthetic hallucinogens that are derivatives of the "2C series" of substances and are often sold as LSD. These substances vary in potency, pharmacological effect and toxicity; errors in dosage may therefore have fatal consequence. As with LSD, NBOMe substances are commonly sold on blotter paper.[73]

Dissociative anaesthetics are a group of substances with hallucinogenic and stimulant properties; they inhibit the reuptake of dopamine, norepinephrine and serotonin, thus intensifying the effect of those three neurotransmitters, and modulate effects at the N-methyl-D-aspartate (NMDA) receptor in the brain and produce feelings of detachment and dissociation from the self and the environment.[74] The most prominent example of this group on illicit drug markets is PCP, which was introduced in the 1950s as an anaesthetic but, owing to its adverse effects, its clinical use was terminated in 1967.[75]

PCP and some of its analogues, including eticyclidine (PCE), rolicyclidine (PHP, PCPY) and tenocyclidine (TCP), are controlled substances under the 1971 Convention, but derivatives such as 3-MeO-PCE and 4-MeO-PCP are not under international control.[76] Since 2010, a number of phencyclidine-type substances have also appeared and been reported, in Europe in particular; of them, 4-MeO-PCP is the most common PCP-type substance reported.

The other main substance in this group is ketamine,[77] which is widely used in human and veterinary medicine. Listed on the WHO List of Essential Medicines, ketamine is safer to administer than other types of anaesthetic agents, as well as for pain relief, as it does not depress breathing or lower blood pressure and does not require expensive patient-monitoring equipment.[78] Ketamine is therefore the main anaesthetic used in war zones and countries with poor resources, and is also widely used as a general sedative in veterinary medicine. Ketamine is marketed commercially as an injectable liquid. Supply of ketamine for non-medical use may originate in clandestine laboratories or be diverted from licit channels.[79, 80] Street sellers evaporate the liquid to yield a powder that is either snorted or compressed into a pill and sold under names such as "K", "special K" and "cat Valium".[81] In countries such as Indonesia and Thailand, ketamine may also be sold to unwitting users as "ecstasy" or methamphetamine tablets.[82] Among the effects of its long-term use reported in the literature are dependence, lower urinary tract dysfunction, such as ulcerative cystitis, and increased sexual impulses or violent behaviour.

70 United States, National Institute on Drug Abuse, "What are hallucinogens?" DrugFacts, January 2016.

71 *Terminology and Information on Drugs*.

72 Meyer and Quenzer, *Psychopharmacology: Drugs, the Brain, and Behaviour.*

73 *Terminology and Information on Drugs.*

74 Ibid.

75 Meyer and Quenzer, *Psychopharmacology: Drugs, the Brain, and Behaviour.*

76 UNODC, Early warning advisory on new psychoactive substances, "Phencyclidine-type substances" Available at www.unodc.org.

77 EMCDDA and European Union Agency for Law Enforcement Cooperation (Europol), "EMCDDA–Europol 2010 annual report on the implementation of Council Decision 2005/387/JHA" (Lisbon, 2011), annex 2.

78 WHO, "Fact file on ketamine" (March 2016).

79 Ibid.

80 *World Drug Report 2017,* Booklet 4: *Market Analysis of Synthetic Drugs*.

81 WHO, "Fact file on ketamine".

82 *World Drug Report 2017,* Booklet 4: *Market Analysis of Synthetic Drugs*.

TABLE 6 NPS with hallucinogenic, dissociative or anaesthetic effects reported for the first time in 2017

Substance	Effect group
Eticyclidone	Dissociative-anaesthetic
3-Hydroxyeticyclidine	Dissociative-anaesthetic
1-Methyl-LSD	Hallucinogen
25H-NBOH	Hallucinogen
4-Hydroxy-N-methyl-N-cyclopropyltryptamine	Hallucinogen
5-Methoxy-N,N-tetramethylenetryptamine	Hallucinogen
6-Methoxy-N,N-diisopropyltryptamine	Hallucinogen

Source: UNODC early warning advisory.

Classic hallucinogens such as psilocybin-containing mushrooms were used for centuries by the Aztecs, Maya, Mazatec and other tribes in Mexico and countries in Central America, who developed religious rituals around their consumption.[83] In the twentieth century, the use of hallucinogens was associated with the "psychedelic culture" among young people in the 1960s and 1970s.[84] In later decades, the increased popularity of other substances resulted in a decline in the use of hallucinogens.

In recent times, people report using hallucinogens more for social or recreational purposes, including to have fun, help them deal with stress or enable them to enter into what they perceive as a more enlightened sense of thinking or being.[85] Currently, among the countries reporting data on the use of hallucinogens, most report the use of LSD and non-medical use of ketamine – the latter being reported more in the context of club drugs and drug use in recreational settings.[86]

Since the monitoring of NPS through the UNODC early warning advisory began in 2009, an increasing number of NPS are being classified as hallucinogens and dissociative-anaesthetics. In 2017, out of the 492 NPS reported, hallucinogen NPS accounted for 18 per cent. In 2017, five new hallucinogens and two dissociative-anaesthetics were reported.

Supply of hallucinogens

Supply of hallucinogens has been on the increase for the past two decades

Overall quantities of substances with hallucinogenic properties seized have shown an upward trend over the past two decades. Ketamine has been dominating seizures of substances with hallucinogenic properties (expressed in kilogram equivalents) for the last 15 years and accounted for 87 per cent of the quantity of such substances seized in the last five years. This is potentially misleading, however, as a typical dose of ketamine is far larger (roughly 0.1 g)[87] than a typical dose of LSD (about 0.00005 g), for example.[88] Tentative calculations of the amounts seized expressed in typical doses suggest that, despite its dominance in terms of weight, ketamine accounted for just 24 per cent of all substances with hallucinogenic properties seized, expressed in doses, over the period 2013–2017, while LSD accounted for two thirds and other hallucinogens accounted for 10 per cent of the total. Ketamine dominated seizures of substances with hallucinogenic properties, expressed in doses, over the period 2006–2010,

83 United States, National Institute on Drug Abuse, "Hallucinogens and dissociative drugs", revised, NIDA Research Report Series, NIH Publication No. 15-4209 (Washington D.C., 2015).

84 Meyer and Quenzer, *Psychopharmacology: Drugs, the Brain, and Behaviour.*

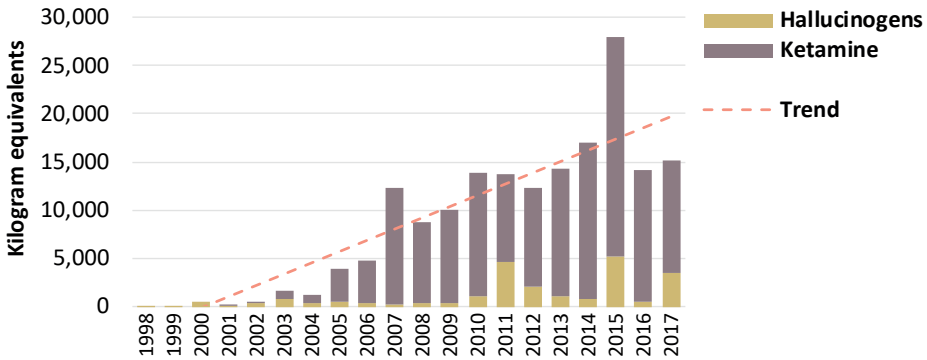
85 "Hallucinogens and dissociative drugs".

86 Jih-Heng Li and others, "To use or not to use: an update on licit and illicit ketamine use", *Substance Abuse and Rehabilitation*, vol. 2, No. 1 (March 2011), pp. 11–20.

87 Depending on the study, individual doses of ketamine vary between 10 to over 250 mg. See the methodological annex to the present publication (available in the online version) for more details.

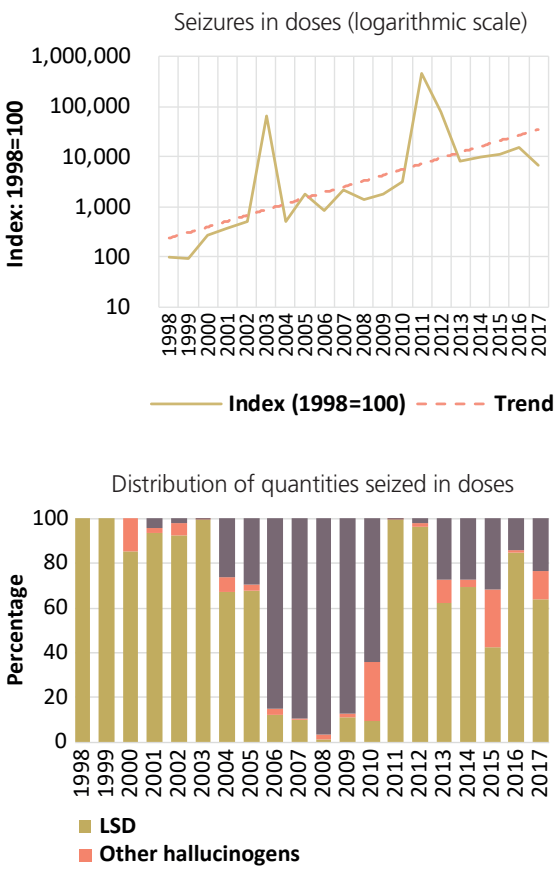
88 This conversion ratio has been used by UNODC for the last 20 years. It dates back to an internal review of such conversion ratios used by law enforcement agencies around the globe.

FIG. 29 Global quantities of substances with hallucinogenic properties seized, expressed in kilogram equivalents, 1998–2017



Source: UNODC, responses to the annual report questionnaire.

FIG. 30 Trend in global quantities of substances with hallucinogenic properties seized, expressed in doses, 1998–2017



Source: UNODC, responses to the annual report questionnaire.

but LSD dominated such seizures over the period 1998–2005 and over the period 2011–2017. When considering the period 1998–2017 as a whole, LSD accounted for 95 per cent of the total amounts of substances with hallucinogenic properties seized expressed in doses, ketamine for 4 per cent and all other hallucinogens for 1 per cent.

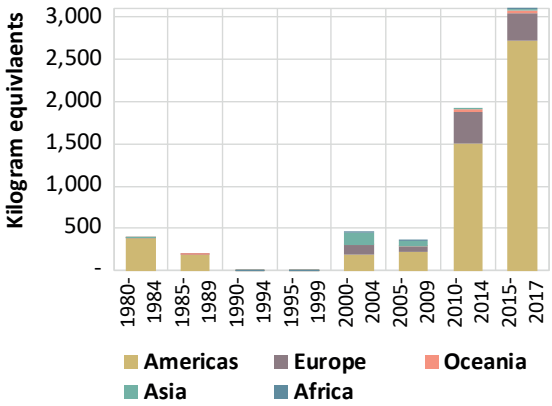
Supply of hallucinogens other than ketamine also on the increase

The quantities of substances with hallucinogenic properties (other than ketamine) seized globally have been fluctuating over time, but have shown an upward trend in recent years, in line with reported qualitative information on increasing use of such substances in recent years.

Overall, 94 countries reported seizures of hallucinogens over the period 1998–2017 (but not every year). Although significant, this is still smaller than the number of countries that reported seizures of cannabis (201), cocaine (186), opioids (183) or ATS (162), indicating that trafficking in hallucinogens is more clustered compared with trafficking in other drug types. Seizures suggest that trafficking in hallucinogens (other than ketamine) has been concentrated in the Americas (most notably the United States), where 88 per cent of the total amount (expressed in kilogram equivalents) was seized over the period 2015–2017, and also in Europe (where 10 per cent was seized).

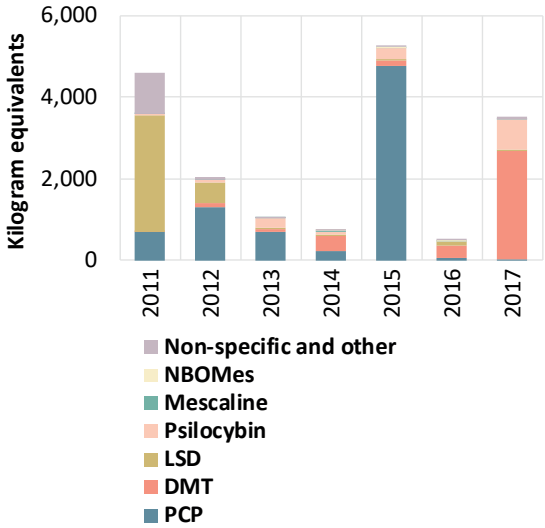
The hallucinogenic substance (other than ketamine) most seized at the global level in terms of weight

FIG. 31 Average annual quantities of hallucinogens (other than ketamine) seized, by region, in kilogram equivalents, 1980–2017



Source: UNODC, responses to the annual report questionnaire.

FIG. 32 Global quantities of hallucinogens (other than ketamine) seized, by substance, in kilogram equivalents, 2011–2017



Source: UNODC, responses to the annual report questionnaire.

over the period 2011–2017 was phencyclidine (PCP), also known by its street name "angel dust"[89] (accounting for 44 per cent of the total quantity of hallucinogens seized), followed by dimethyltryptamine (DMT), also known in the 1971 Convention as 3-[2-(dimethylamino)ethyl]indole (20 per cent), LSD (20 per cent), psilocybin (8 per cent), mescaline, also known as 3,4,5-trimethoxyphenethylamine (0.2 per cent), and the three NBOMe compounds (0.03 per cent).

However, seizure patterns have been changing in recent years. Only available since 2011, a detailed breakdown of the hallucinogens (other than ketamine) seized indicates that LSD and, later, PCP were the hallucinogenic substances mostly seized in the early 2010s, and that DMT started to dominate global seizures after that. The large share of PCP was exclusively the result of large amounts of the substance seized in the Americas (notably in North America). DMT, by contrast, was not only the most commonly seized hallucinogenic substance in the Americas, in terms of weight, in 2016, but also in Europe and in Oceania in the same year. It was the most commonly seized hallucinogenic substance (again in terms of weight) in the Americas, Europe and in Asia in 2017.

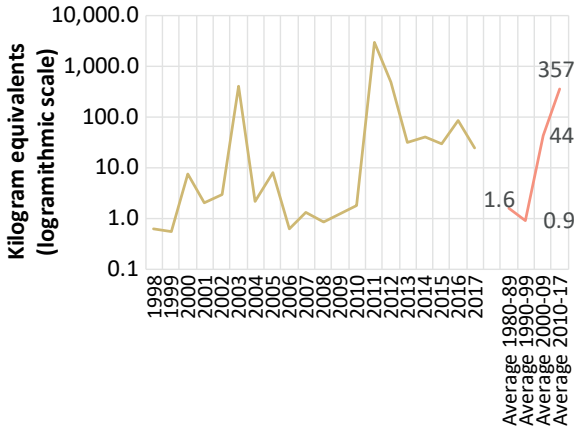
89 "Hallucinogens and dissociative drugs".

In terms of average doses, the total amount of hallucinogens seized would still have been dominated by LSD: it accounted for more than 99 per cent of all hallucinogens (excluding ketamine) seized over the period 1998–2017. Although the "typical dose" to be applied to each hallucinogenic substance is the subject of debate, as doses vary among individual users, as do the typical doses found in the literature, there can be no doubt that seizures of hallucinogens, when converted into doses, continue to be dominated by LSD.

The quantities of LSD seized, however, have been extremely erratic, with peaks typically reflecting the dismantling of LSD production laboratories.

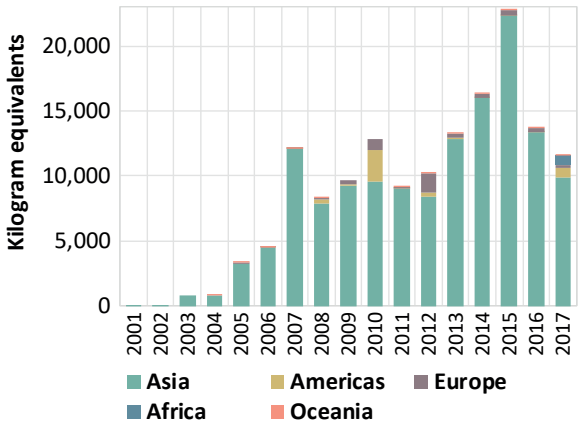
In terms of trafficking, data reported by Member States suggest that the most frequently mentioned countries of origin, departure or transit of LSD over the period 2013–2017 were: for the Americas, the United States, followed by Argentina and China; for Europe, the Netherlands, followed by the United Kingdom, Belgium, Spain and Germany; for Asia, India, followed by the Netherlands, the United Kingdom and Canada; for Oceania, the Netherlands, followed by Canada and the United Kingdom; and for Africa, South Africa.

FIG. 33 Global quantities of LSD seized, in kilogram equivalents, 1980–2017



Source: UNODC, responses to the annual report questionnaire.

FIG. 34 Global quantities of ketamine seized, by region, 2001–2017



Source: UNODC, responses to the annual report questionnaire.

A substance of concern mainly in East and South-East Asia, ketamine is spreading to other regions

Although ketamine has important medical uses, its use as a recreational drug may also explain the large amounts of it seized at the global level, which easily exceed, in terms of quantity, the amount of hallucinogens under international control seized globally. The main ketamine markets continue to be in Asia but, based on seizures and qualitative information reported by Member States, ketamine trafficking appears to be spreading to other regions.

The quantities of ketamine seized showed a marked upward trend until 2015, when they peaked at 23 tons, before falling to 12 tons in 2017.

In contrast to hallucinogens in general, and to PCP (another dissociative anaesthetic that is mainly encountered in the Americas) in particular, ketamine is most widespread in Asia. Over the period 2013–2017, 89 per cent of all ketamine seized worldwide was seized by authorities in Asia. Most of the ketamine seized was reported (in descending order of the amount seized) by China, followed by Taiwan Province of China, Hong Kong, China, Malaysia, Myanmar, Thailand, the United Kingdom, India and the Netherlands. The amount of ketamine reported seized outside Asia, while still small, tripled over the period 2015–2017, the increase being most notable in Africa, the Americas and Oceania.

The most frequently mentioned point of origin, departure or transit for ketamine at the global level over the period 2013–2017 was India, followed by China, Malaysia, Taiwan Province of China and Hong Kong, China. Most shipments of ketamine originating in Asia remain in the region.

In Europe, most ketamine seems to transit or originate in India and Belgium, followed by the Netherlands and Czechia; in the Americas, the United States, followed by China and Hong Kong, China; and in Oceania, the United Kingdom, India and Hong Kong, China.

Even though the non-medical use of ketamine continues to be of concern primarily in countries and territories in Asia, the total number of countries reporting ketamine seizures to UNODC rose from just 2 in 2001 to 17 in 2005, before more than doubling, to 36, in 2017, indicating that ketamine trafficking is no longer exclusively a phenomenon found in Asia, even though ketamine markets outside the region are still quite small. Overall, 47 countries and territories reported ketamine seizures to UNODC over the period 2001–2017, of which 21 are in Europe, 16 are in Asia (mostly East and South-East Asia and, to a lesser extent, South Asia), 6 in the Americas, 2 in Africa (East and North-Africa) and 2 in Oceania.

Demand for hallucinogens

Use of hallucinogens appears to be on the increase again

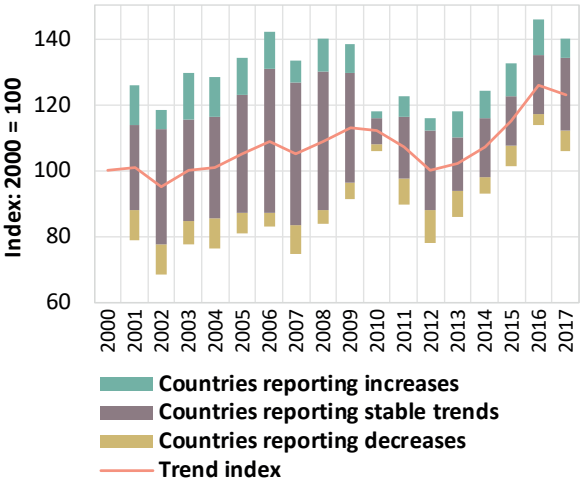
While there are no global estimates on the use of hallucinogens, many countries report their use to UNODC; however, in many instances, they do so without specifying the type of hallucinogen. The ranking of drugs by Member States suggests that the use of hallucinogens at the global level (with a ranking of, on average, 5.3 over the 2013–2017 period) is less of a concern than the use of cannabis, ATS, sedatives and tranquillizers, opioids and cocaine.[90]

For every year during the period 2001–2017 for which qualitative information on trends in the use of different substances is available, the majority of countries reported no significant change in the use of hallucinogens. Nonetheless, there are signs of a perceived increase in the overall use of hallucinogens in recent years, particularly over the period 2012–2016, with the number of countries reporting increases in the use of hallucinogens greater than the number of countries reporting decreases. However, recent or current use of hallucinogens in general is quite low in most countries and there is limited recent scientific literature on the epidemiology and patterns of such use. The use of hallucinogens and dissociative or anaesthetic substances is quite varied; for example, the use of LSD and substances with similar effects is more common in South and North America, Western and Central Europe and Oceania (Australia) than in other regions. The use of LSD, although not at the same level as other drugs, seems to be on the increase in both North and South America. The use of ketamine, on the other hand, is mainly reported in South-East Asia, with mixed trends in its use being reported in the subregion.

In 2017, a number of countries in Asia reported the use of LSD,[91] although prevalence data are not available for most of them. In the case of Indonesia, where quantitative measures are available, "magic mushrooms" are the main hallucinogens reported, with a low prevalence (0.01 per cent) in comparison with the use of other drugs. Ketamine use in South-East Asia is also quite common, with eight countries and territories reporting the use of ketamine in recent years. Qualitative information on trends in the use of ketamine shows that there has been an increase in the use of ketamine in Cambodia, Indonesia and Thailand, while use of the drug has declined in China, including in Hong Kong, China, and Macao, China, and Myanmar. In South-East Asia, the use of ketamine has been primarily associated with recreational and club settings, within a polydrug use scenario (with "ecstasy" and cannabis) and, in many countries, has even surpassed the use of other club drugs.[92]

In Australia, the prevalence of the use of hallucinogens and dissociatives remains lower than that of other drugs, with the annual reported prevalence of LSD being 1 per cent and the annual reported prevalence of ketamine being 0.4 per cent in 2016. Over the years, the use of LSD has declined in Australia, in particular, over the period 2013–2016, while the non-medical use of ketamine increased over the same period, following a period of relative stability.[93]

FIG. 35 Qualitative information on trends in the use of hallucinogens, 2000–2017



Source: UNODC, responses to the annual report questionnaire.

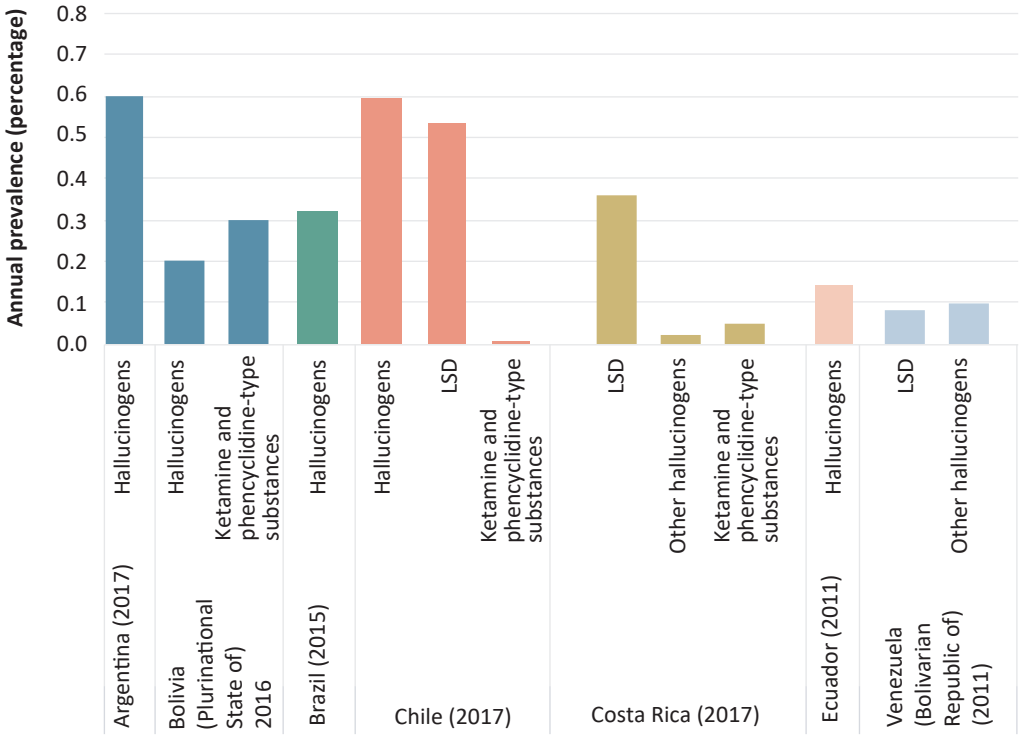
90 This is based on data on drug rankings provided to UNODC by 123 countries, including 78 countries providing such information on hallucinogens, over the period 2013–2017.

91 Those countries include Iran (Islamic Republic of), Japan, Kazakhstan, Lebanon, Oman, the Republic of Korea, Singapore, Sri Lanka and the United Arab Emirates.

92 Li and others, "To use or not to use".

93 Australian Institute of Health and Welfare, *National Drug*

FIG. 36 Use of hallucinogens in Central and South America



Source: UNODC, responses to the annual report questionnaire.

In the countries in South America that report it, the annual prevalence of use of hallucinogens ranges from 0.1 per cent in the Bolivarian Republic of Venezuela to about 0.6 per cent of the population aged 15–64 in Argentina and Chile. In Argentina, according to a 2017 survey, 0.6 per cent of the population aged 12–65 had used hallucinogens (including LSD, peyote, PCP and mescaline)[94] in the past year. The use of hallucinogens is reported to be higher among men (1.0 per cent) than women (0.2 per cent). Past-year use was highest among those aged 18–24 (1.9 per cent) and 25–34 (1.0 per cent). Chile is one country in the subregion that reports a considerable increase in past-year use of LSD. The past-year prevalence of LSD increased sixfold, from 0.1 per cent of the population aged 12–64 in 2002 to 0.6 per cent of the same population group in 2016,[95] a trend also seen, for example, in a survey of university students (aged 18–25 years) in the Andean countries. The past-year prevalence of LSD among the four countries ranged from 0.2 per cent in Peru to 1 per cent in Ecuador and 4.2 per cent in Colombia. Overall, past-year use of LSD increased considerably among university students in those four countries, from an estimated 0.2 per cent in 2009 to 1.6 per cent in 2016.[96] The increase observed in LSD use among university students was driven primarily by an increase in LSD use among students in Colombia, where it increased fourfold

Strategy Household Survey 2016: Detailed Findings, Drug Statistics Series No. 31 (Canberra, September 2017).

94 Argentina, Secretariat for Comprehensive Drug Policies (Sedronar), *Estudio Nacional en Población de 12 a 65 años, sobre Consumo de Sustancias Psicoactivas: Argentina 2017–Informe de Resultados No.1: Magnitud del Consumo de Sustancias a Nivel Nacional* (Buenos Aires, 2017).

95 Chile, Ministry of the Interior and Public Security, National Drug and Alcohol Prevention and Rehabilitation Service (SENDA), *Décimo Segundo Estudio Nacional De Drogas en Población General de Chile, 2016* (Santiago, Chilean Drug Observatory, 2017).

96 UNODC, *III Estudio Epidemiológico Andino sobre Consumo de Drogas en la Población Universitaria: Informe Regional 2016* (Lima, 2017).

over the period 2009–2016. The appearance of hallucinogenic NPS such as NBOMe, which in many countries are reportedly sold as LSD, is also noteworthy in South America. NBOMes have emerged onto the existing and possibly growing market for hallucinogens in the subregion in recent years.[97]

In the United States, the annual prevalence of LSD use is reported as 0.9 per cent of the population aged 12 and older and the use of PCP is negligible, while Canada has reported the annual prevalence of hallucinogen use as 1.4 per cent of the adult population. The use of *Salvia divinorum* is also quite prevalent in Canada: among the general population, a lifetime prevalence of 2.7 per cent was reported in 2015 and the past-year prevalence of *Salvia divinorum* use among 15–16 year olds was 1.5 per cent in the period 2015–2016.

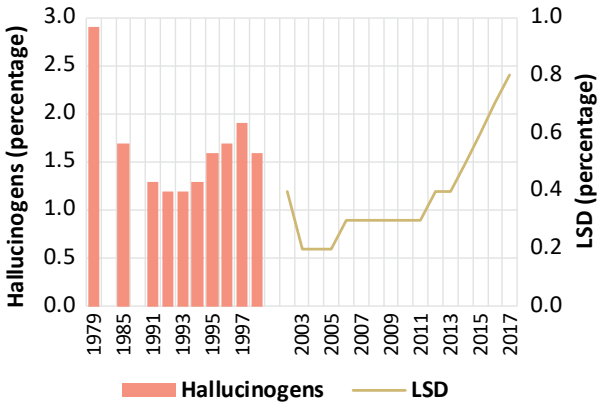
The long-term trend in the use of hallucinogens in the United States, which also reports seizing the largest amount of hallucinogens (excluding ketamine) worldwide, shows that, following a strong downward trend in the 1980s, the use of hallucinogens started increasing in the 1990s. Subsequent data for the use of LSD, the drug most associated with the use of hallucinogens, showed quite a stable trend during the 2000s and a sharp increase since 2010.

The use of hallucinogens among students in twelfth grade in the United States is relatively common, although it is not at the same level as the use of cannabis and opioids. In recent years, the use of LSD was reported to be increasing, the use of PCP has remained at similar levels to those of the 1990s, while the use of *Salvia divinorum* and ketamine has declined considerably, in particular among students in the twelfth grade.

In Europe, the overall prevalence of LSD and hallucinogenic mushroom use has been generally low and stable for a number of years. The unweighted average annual prevalence of LSD in the States members of the European Union and Norway, based on the latest available data, is estimated at 0.2 per cent of the population aged 15–64, ranging from 0.7 per cent in Czechia and 0.5 per cent in Finland to 0.1 per cent in Slovakia and Slovenia. The use of

97 *World Drug Report 2017*, Booklet 4: *Market Analysis of Synthetic Drugs*.

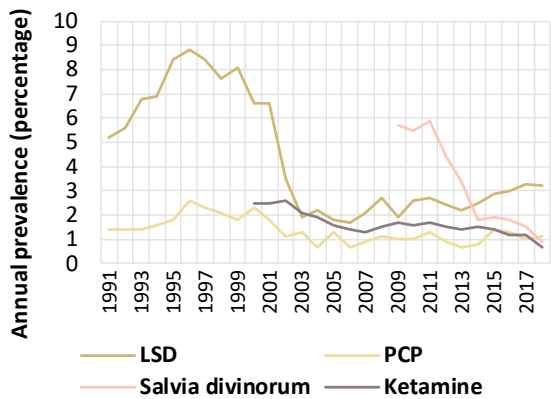
FIG. 37 Use of hallucinogens in the United States of America, 1979–2017



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2017 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2018).

Note: From 1979 to 1998, the category "hallucinogens" included the use of LSD and PCP; from 2002 onwards, MDMA was included in the drug category "hallucinogens" and, as the use of PCP is negligible, the table above shows the prevalence of LSD use only from 2002 onwards.

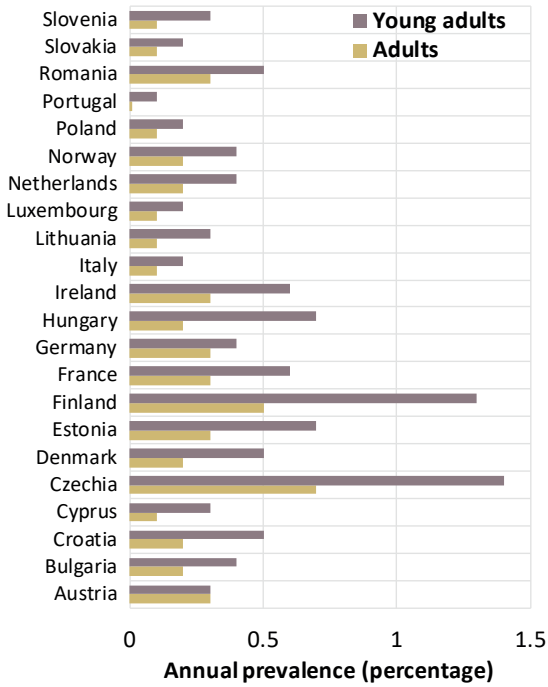
FIG. 38 Use of hallucinogens among twelfth grade students in the United States of America, 1991–2018



Source: United States, National Institute on Drug Abuse, "Trends in Prevalence of Various Drugs", Monitoring the Future Study (revised December 2018). Available at www.drugabuse.gov/trends-statistics/monitoring-future/monitoring-future-study-trends-in-prevalence-various-drugs.

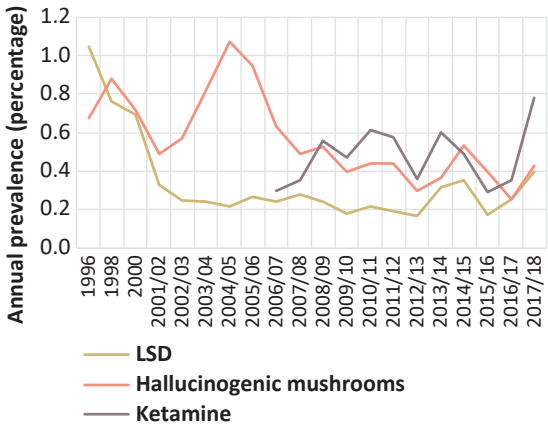
LSD among young adults (aged 15–34) is much higher than among all adults (aged 15–64), ranging from 1.4 per cent in Czechia and 1.3 per cent in Finland to 0.1 per cent in Portugal. The countries that have reported the use of *Salvia divinorum* in Europe are Italy and Spain, while the use of ketamine has only been reported in Czechia, England

FIG. 39 LSD use among young adults (aged 15–34) and adults (aged 15–64) in Europe



Source: EMCDDA, "Prevalence of drug use", Statistical Bulletin 2018.

FIG. 40 Use of hallucinogens in England and Wales, 1996–2017/18



Source: United Kingdom of Great Britain and Northern Ireland, Home Office, "Drug misuse: findings from the 2017/18 crime survey for England and Wales", Statistical Bulletin 14/18 (London, 2018), Appendix tables.

and Wales, and Spain. In England and Wales, there has been a significant increase in the past-year use of hallucinogens. In the United Kingdom, ketamine was rescheduled from a class C to class B substance in 2014, but its use over the 12-month periods 2016/17 and 2017/18 increased considerably, driven by an increase from 1.2 per cent to 3.1 per cent among 16–24-year olds. This is the highest estimate of ketamine use since measurement of use of the drug began in that country, in 2006–2007.[98]

Another measure of the extent of use of hallucinogens and dissociative-anaesthetics is the Global Drug Survey. However, the respondents cannot be said to be a representative sample of the global population as respondents are primarily young people with access to the Internet, most of whom live in Europe.[99] In 2018, half of the respondents were younger than 25 and about 19 per cent were 35 years or older. The 2018 results, based on responses from 130,000 respondents, showed that, among the 10 substances that had been most commonly used in the past12 months, 4 were hallucinogens and dissociative or anaesthetic substances; 11 per cent of the respondents reported past-year use of LSD, 9.2 per cent use of hallucinogenic mushrooms, 6.5 per cent misuse of ketamine and 1 per cent use of *Salvia divinorum*. Among the hallucinogens and dissociative or anaesthetic substances, ketamine, LSD and hallucinogenic mushrooms also featured in the list of 13 substances for which young people had sought medical treatment as a result of acute drug intoxications.

98 United Kingdom of Great Britain and Northern Ireland, Home Office, "Drug misuse: findings from the 2017/18 crime survey for England and Wales", Statistical Bulletin 14/18 (London, 2018).

99 Adam R. Winstock and others, *Global Drug Survey (GDS) 2018: Key Findings Report 2018* (London, 2018).

TABLE 7 Annual prevalence of the use of cannabis, by region and globally, 2017

	Number of users annually (best estimate)	Estimated number ofusers annually (lower)	Estimated number of users annually (upper)	Per cent of population aged 15–64 years (best estimate)	Per cent of population aged 15–64 years (lower)	Per cent of population aged 15–64 years (upper)
Africa	**44,900,000**	**35,350,000**	**62,690,000**	**6.4**	**5.1**	**9.0**
Eastern Africa	-	-	-	-	-	-
Northern Africa	-	-	-	-	-	-
Southern and South-Eastern Africa	-	-	-	-	-	-
West and Central Africa	26,760,000	25,700,000	29,420,000	10.0	9.6	11.0
Americas	**56,590,000**	**55,600,000**	**58,330,000**	**8.4**	**8.3**	**8.7**
Caribbean	1,040,000	580,000	2,090,000	3.6	2.0	7.2
Central America (excluding Mexico)	880,000	820,000	990,000	2.9	2.7	3.3
Northern America (including Mexico)	44,630,000	44,460,000	44,810,000	13.8	13.7	13.8
South America	10,040,000	9,740,000	10,440,000	3.5	3.4	3.6
Asia	**54,210,000**	**41,140,000**	**64,840,000**	**1.8**	**1.4**	**2.2**
Central Asia and Transcaucasia	1,670,000	640,000	2,410,000	2.9	1.1	4.2
East and South-East Asia	13,570,000	4,160,000	21,740,000	0.8	0.3	1.4
Near and Middle East/South-West Asia	9,500,000	6,890,000	11,180,000	3.1	2.3	3.7
Southern Asia	29,470,000	29,430,000	29,520,000	2.9	2.9	2.9
Europe	**29,490,000**	**28,810,000**	**30,210,000**	**5.4**	**5.3**	**5.6**
Eastern and South-Eastern Europe (including Turkey)	5,880,000	5,530,000	6,220,000	2.6	2.5	2.8
Western and Central Europe	23,610,000	23,270,000	23,990,000	7.4	7.3	7.5
Oceania	**2,840,000**	**2,790,000**	**2,950,000**	**10.9**	**10.7**	**11.3**
Australia and New Zealand	2,090,000	2,090,000	2,090,000	11.0	11.0	11.0
Melanesia	-	-	-	-	-	-
Micronesia	60,000	40,000	80,000	17.2	11.3	23.1
Polynesia	-	-	-	-	-	-
Global	**188,040,000**	**163,680,000**	**219,020,000**	**3.8**	**3.3**	**4.4**

Source: UNODC estimates based on annual report questionnaire data and other official sources.

TABLE 8 Cannabis cultivation, production and eradication, latest year available from the period 2012–2017

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2012	Afghanistan	resin	outdoors	10,000			1,400		
2017	Albania	herb	indoors					7,766	
2016	Albania	herb	outdoors					2,536,288	5,205
2017	Albania	herb	outdoors					66,927	500
2014	Algeria	resin	outdoors					2,522	
2016	Armenia	herb	outdoors	0.50 [a]	0.50	0.00		757	20
2017	Armenia	herb	outdoors	0.50 [a]	0.50	0.00		2,547	21
2016	Australia	herb	indoors					31,266	408
2017	Australia	herb	indoors					78,310	433
2016	Australia	herb	outdoors					22,257	1,021
2017	Australia	herb	outdoors	1.00 [a]	1.00	0.00		31,431	948
2015	Austria	herb	outdoors	3.00 [a]	3.00	0.00			
2013	Azerbaijan	herb	outdoors	23.95 [a]	23.95	0.00	263.96	8,469	151
2014	Azerbaijan	herb	outdoors	17.50 [a]	17.50	0.00		14,889	195
2017	Azerbaijan	herb	outdoors	0.25 [a]		0.25		336,791	
2015	Bahamas	herb	outdoors					17,270	
2012	Bangladesh	herb	outdoors					39,848	
2013	Bangladesh	herb	outdoors					35,012	
2014	Bangladesh	herb	outdoors					35,988	
2015	Bangladesh	herb	outdoors					39,967	
2016	Bangladesh	herb	outdoors					47,104	
2016	Belarus	herb	indoors						28
2017	Belarus	herb	indoors						32
2016	Belarus	herb	oudoors		123.80				1,945
2017	Belarus	herb	oudoors		125.90				2,283
2015	Belgium	herb	indoors					345,518	1,164
2017	Belgium	herb	indoors					415,728	1,175
2015	Belgium	herb	outdoors					4,885	93
2017	Belgium	herb	outdoors					848	59
2015	Belize	herb	outdoors					50,897	
2016	Bolivia (Plurinational State of)	herb	outdoors		14.60				35
2017	Bolivia (Plurinational State of)	herb	outdoors		14.00				52

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2016	Bosnia and Herzegovina	herb	indoors		39.00				
2017	Bosnia and Herzegovina	herb	indoors					1	1
2016	Bosnia and Herzegovina	herb	outdoors		1,680.00				
2017	Bosnia and Herzegovina	herb	outdoors	0.02 [a]	0.02	0.00		539	53
2014	Brazil	herb	outdoors		44.01			1,364,316	
2017	Brazil	herb	outdoors		117.51			1,910,451	604
2015	Bulgaria	herb	indoors					323	
2015	Bulgaria	herb	outdoors				37.77	9,488	
2017	Central African Republic	herb	outdoors	130.00	60.00	55	10.00	250,000	22
2016	Chile	herb	indoors					26,988	2,740
2017	Chile	herb	indoors					50,414	2,408
2016	Chile	herb	outdoors					58,950	264
2017	Chile	herb	outdoors					194,694	202
2016	China	herb	outdoors		9.80			1,390,000	
2016	Colombia	herb	outdoors		135.00				
2017	Colombia	herb	outdoors		173.71				
2016	Costa Rica	herb	indoors					678	5
2017	Costa Rica	herb	indoors						2
2016	Costa Rica	herb	outdoors		17.59			2,122,244	201
2017	Costa Rica	herb	outdoors						215
2016	Côte d'Ivoire	herb	outdoors					5	
2017	Côte d'Ivoire	herb	outdoors		0.25				1
2016	Czechia	herb	indoors					53,549	229
2017	Czechia	herb	indoors					50,925	305
2016	Czechia	herb	outdoors					4,111	
2017	Czechia	herb	outdoors					3,467	
2015	Denmark	herb	indoors/out-doors					14,560	97
2016	Denmark	herb	indoors/out-doors					13,217	105
2017	Denmark	herb	indoors/out-doors					34,801	65
2014	Dominican Republic	herb	outdoors	6.00 [a]	6.00	0.00	0.21	111	8
2016	Ecuador	herb	outdoors					224	34

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2017	Ecuador	herb	outdoors					397	10
2015	Egypt	herb/resin	outdoors		140.00				
2017	Egypt	herb/resin	outdoors		126.00				
2014	Eswatini	herb	outdoors	1,500.00	1,069.50	430.50		3,000,000	210
2017	Georgia	herb	indoors		0.01			186	91
2017	Georgia	herb	outdoors	0.02 [a]	0.02	0.00		93	19
2016	El Salvador	herb	outdoors			1.00		227	25
2014	France	herb	outdoors					158,592	837
2015	Germany	herb	indoors					135,925	786
2017	Germany	herb	indoors					85,226	573
2015	Germany	herb	outdoors					9,136	127
2017	Germany	herb	outdoors						95
2016	Greece	herb	indoors					16,554	
2017	Greece	herb	indoors					19,498	
2016	Greece	herb	oudoors					39,151	
2017	Greece	herb	oudoors					27,409	
2016	Guatemala	herb	outdoors		9.00			3,138,298	427
2017	Guatemala	herb	outdoors	3.50 [a]	3.81		1.61	6,033,345	150
2015	Guyana	herb	outdoors	20.00	9.40	10.60	1,000.00	419,700	19
2016	Honduras	herb	indoors					7	2
2016	Honduras	herb	outdoors					24,253	19
2017	Honduras	herb	outdoors	59.58 [a]	59.59	0.00			
2016	China, Hong Kong SAR	herb	indoors					329	1
2016	Hungary	herb	indoors					5,000	3
2016	Hungary	herb	outdoors					2,000	20
2013	Iceland	herb	indoors					6,652	323
2016	India	herb	outdoors		3,414.74				
2017	India	herb	outdoors		3,445.90			6,687,376	
2016	Indonesia	herb	outdoors	482.00 [a]	482.00	0.00			
2017	Indonesia	herb	outdoors	89.00 [a]	89.00	0.00		738,020	14
2016	Ireland	herb	indoors					7,273	
2017	Ireland	herb	indoors					9,046	50
2017	Italy	herb	indoors					56,125	1,161
2017	Italy	herb	outdoors					209,510	401

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2014	Italy	herb	indoors					51,534	639
2014	Italy	herb	outdoors					70,125	1,134
2012	Jamaica	herb	outdoors					456	382
2016	Kazakhstan	herb	outdoors	18.00 [a]	18.00	0.00		170,000	202
2017	Kazakhstan	herb	outdoors	12.30 [a]	12.30	0.00		930,774	91
2016	Kenya	herb	outdoors	12.00				8,747	46
2017	Kenya	herb	outdoors		0.10			4,662	
2015	Kyrgyzstan	herb	outdoors	5,014.00		5,014.00			
2016	Latvia	herb	indoors					557	35
2017	Latvia	herb	indoors					798	34
2016	Latvia	herb	outdoors					78	6
2017	Latvia	herb	outdoors					66	15
2015	Lebanon	herb	outdoors	3,500.00		3,500.00			
2017	Lebanon	herb	outdoors	40,772.00					
2016	Lithuania	herb	indoors						4
2017	Lithuania	herb	indoors						8
2017	Lithuania	herb	outdoors						7
2015	Madagascar	herb	outdoors		11.00			21,325	
2017	Madagascar	herb	outdoors		9.00			57,708	
2013	Malta	herb	indoors					27	
2016	Mexico	herb	outdoors		5,478.42		6,574.1		38,432
2017	Mexico	herb	outdoors		4,193.34		5,032.0		34,523
2013	Mongolia	herb	outdoors	15,000.00	4,000.00	11,000.00		4,000	4,000
2016	Morocco	plant	outdoors	47,000.00	395.00	46,605.00			
2017	Morocco	plant	outdoors	47,500.00	523.00	46,977.00			
2016	Morocco	herb	outdoors				35,652.83		
2017	Morocco	herb	outdoors				35,702.90		
2016	Morocco	resin	outdoors				713.00		
2017	Morocco	resin	outdoors				714.06		
2014	Myanmar	herb	outdoors	15.00	10.00	5.00			3
2016	Netherlands	herb	indoors					994,068	5,856
2017	Netherlands	herb	indoors					883,163	5,538
2016	New Zealand	herb	indoors					18,903	607
2017	New Zealand	herb	indoors					19,992	

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2016	New Zealand	herb	outdoors					104,725	
2017	New Zealand	herb	outdoors					19,559	
2014	Nicaragua	herb	outdoors		0.30		1,507.00	3,014	30
2016	Nigeria	herb	outdoors		718.78				65
2017	Nigeria	herb	outdoors		317.12				
2015	Norway	herb	indoors		0.04			4,000	30
2013	Panama	herb	indoors	0.50 [a]	0.50	0.00		37	2
2013	Panama	herb	outdoors	10.50 [a]	10.50	0.00		78,633	2
2016	Paraguay	plant	outdoors	1,298.50 [a]	1,298.50	0.00		5,656,266	4
2017	Paraguay	plant	outdoors		1,462.00			36,550,000	
2016	Paraguay	herb	outdoors				1,298.50		
2016	Paraguay	resin	outdoors				1.15		
2016	Peru	herb	outdoors		87.83			1,429,749	
2017	Peru	herb	outdoors		61.30			4,671,387	47
2016	Philippines	herb	outdoors		8.67			24,635,153	337
2017	Philippines	herb	outdoors		4.82			221,035	27
2016	Poland	herb	indoors					146,755	1,403
2017	Poland	herb	indoors					448	10
2016	Poland	herb	indoors/ outdoors					4,585	219
2017	Poland	herb	indoors/ outdoors						54
2017	Portugal	herb	indoors/ outdoors					22,910	158
2013	Republic of Korea	herb	outdoors					8,072	
2014	Republic of Moldova	herb	outdoors	100.00	59.00	41.00	10,000.00	200,548	
2017	Republic of Moldova	herb	outdoors	0.15	2.57			257,236	
2014	Republic of Moldova	herb	indoors		41.00				
2016	Romania	herb	indoors					1,433	41
2017	Romania	herb	indoors					1,875	46
2016	Romania	herb	outdoors		6.99				42
2017	Romania	herb	outdoors		1.90			4,905	32
2016	Russian Federation	herb	indoors		0.66				788
2017	Russian Federation	herb	indoors		0.87				1,990
2016	Russian Federation	herb	outdoors	7.61 [a]	7.61	0.00	68.64		1,143

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2017	Russian Federation	herb	outdoors	159.00 [a]	159.00	0.00	30.07		5,379
2015	Serbia	herb	outdoors				0.05		
2013	Sierra Leone	herb	outdoors	190.00		190.00		190	3
2016	Slovakia	herb	indoors					385	
2017	Slovakia	herb	outdoors	2.00 [a]	2.00	0.00		2,299	31
2014	Slovenia	herb	indoors					9,223	118
2017	Slovenia	herb	indoors					10,259	78
2014	Slovenia	herb	outdoors					1,844	
2015	Spain	herb	indoors					244,772	108
2015	Spain	herb	outdoors					135,074	44
2014	Sudan	herb	outdoors	8.00 [a]	8.00	0.00	345.00		
2017	Sudan	herb	outdoors	1,250.00 [a]	1,250.00	0.00	205.00		100
2014	Sweden	herb	indoors					10,000	56
2015	Sweden	herb	outdoors				182.00		
2017	Sweden	herb	outdoors					5,100	44
2016	Switzerland	herb	indoors					11,386	83
2017	Switzerland	herb	indoors					71,750	
2012	Tajikistan	herb	outdoors					2,180,121	
2016	Thailand	herb	outdoors	1.00 [a]	1.00	0.00	7.50		1
2015	Trinidad and Tobago	herb	outdoors		0.31			375,925	58
2012	Uganda	herb	outdoors	150.00	88.00	62.00			5
2016	Ukraine	herb	outdoors	91.00 [a]	91.00	0.00			
2017	Ukraine	herb	outdoors		166.90			4,600,000	
2016	United States of America	herb	indoors					406,125	1,865
2017	United States of America	herb	indoors					303,654	1,399
2016	United States of America	herb	outdoors					4,940,596	5,513
2017	United States of America	herb	outdoors					3,078,418	4,062
2016	Uruguay	herb	indoors					661	
2017	Uruguay	herb	indoors					1,926	
2016	Uzbekistan	herb	outdoors	0.20 [a]	0.20	0.00			586
2017	Uzbekistan	herb	outdoors	0.20 [a]	0.20	0.00			618
2015	Viet Nam	herb	oudoors		1.00				

Source: United Nations Office on Drugs and Crime annual report questionnaire, government reports and and international narcotics control strategy reports of the United States of America.

[a] *Area identified by the authorities for eradication.*

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

fentanyls — fentanyl and its analogues.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term that refers both to opiates and their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs. For example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition) of the American Psychiatric Association, or the *International Classification of Diseases and Related Health Problems* (tenth revision) of WHO.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. Harmful use of substances and dependence are features of drug use disorders. People with drug use disorders need treatment, health and social care and rehabilitation.

harmful use of substances — defined in the *International Statistical Classification of Diseases and Related Health Problems* (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the *International Statistical Classification of Diseases and Related Health Problems* (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena that develop after repeated substance use and that typically include a strong desire to take the drug, difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and sometimes a physical withdrawal state.

substance or drug use disorders — referred to in the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition) as patterns of symptoms resulting from the repeated use of a substance despite experiencing problems or impairment in daily life as a result of using substances. Depending on the number of symptoms identified, substance use disorder may be mild, moderate or severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The *World Drug Report* uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania and Mayotte
- North Africa: Algeria, Egypt, Libya, Morocco, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe and Reunion
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo and Saint Helena
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Anguilla, Aruba, Bonaire, Netherlands, British Virgin Islands, Cayman Islands, Curaçao, Guadeloupe, Martinique, Montserrat, Puerto Rico, Saba, Netherlands, Sint Eustatius, Netherlands, Sint Maarten, Turks and Caicos Islands and United States Virgin Islands
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico, United States of America, Bermuda, Greenland and Saint-Pierre and Miquelon
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of) and Falkland Islands (Malvinas)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste, Viet Nam, Hong Kong, China, Macao, China, and Taiwan Province of China
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, North Macedonia, Romania, Serbia, Turkey and Kosovo
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland, Faroe Islands, Gibraltar and Holy See

Oceania (comprising four subregions):

- Australia and New Zealand: Australia and New Zealand
- Polynesia: Cook Islands, Niue, Samoa, Tonga, Tuvalu, French Polynesia, Tokelau and Wallis and Futuna Islands
- Melanesia: Fiji, Papua New Guinea, Solomon Islands, Vanuatu and New Caledonia
- Micronesia: Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Palau, Guam and Northern Mariana Islands

UNODC
United Nations Office on Drugs and Crime

UNODC Research

Vienna International Centre, PO Box 500, 1400 Vienna, Austria
Tel: +(43) (1) 26060-0, Fax: +(43) (1) 26060-5866, www.unodc.org

The *World Drug Report 2019* is again presented in five separate parts that divide the wealth of information and analysis contained in the report into individual reader-friendly booklets in which drugs are grouped by their psychopharmacological effect for the first time in the report's history.

Booklet 1 provides a summary of the four subsequent booklets by reviewing their key findings and highlighting policy implications based on their conclusions. Booklet 2 contains a global overview of the latest estimates of and trends in the supply, use and health consequences of drugs. Booklet 3 looks at recent trends in the market for depressants (including opioids, sedatives, tranquillizers and hypnotics), while Booklet 4 deals with recent trends in the market for stimulants (including cocaine, amphetamine-type stimulants and new psychoactive substances). Booklet 5 contains a review of recent trends in the market for cannabis and for hallucinogens. The section on cannabis also includes a review of the latest developments in the jurisdictions that have adopted measures allowing the non-medical use of cannabis.

As in previous years, the *World Drug Report 2019* is aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health, governance and security.

The statistical annex is published on the UNODC website: https://www.unodc.org/wdr2019

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